UNGAVA BAY
A RESOURCE SURVEY
1958

by
JON EVANS

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The opinions expressed in this report are those of the author and not necessarily those of the Department of Northern Affairs & National Resources.

Industrial Division,
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Foreword

In 1957-58, the Development Section of the Arctic Division of the Department of Northern Affairs and National Resources carried out a study of possible economic development in Ungava Bay.

Living conditions among the Eskimos in the Ungava Bay region, at that time, were extremely depressed, and it was felt that some attempt had to be made to determine how their standard of living could be raised. The original reports resulting from the study were printed in limited quantities, and circulated only within the Department. Since 1958, a number of resource surveys have been carried out by the Department in other parts of the Canadian North, and reports on them published. This work is now the responsibility of the Projects and Area Survey Section of the Industrial Division of the Northern Administration Branch.

The reports on the 1957-58 survey are being brought out in report form at this time for a number of reasons. This survey, the first of a number of similar surveys that will cover the whole of the Canadian North over the next few years, shows the sort of techniques used to assess the resources of this part of the world. The economic development of the world's marginal areas is becoming a pressing problem, and the Ungava Bay survey represents a unique experience in this respect. Secondly, the report contains a great deal of basic information on the area that may be of general interest. Finally, this report will complement the report of the 1962 survey of the west coast of Ungava Bay.

The report falls into three sections. The first is a general introduction to the whole Ungava Bay area, based on the literature available at the time, and discussions with people who had knowledge of the area. This phase of library research preceded the field study carried out by the writer in 1958. The results of this field study are covered in Part 2. The last part covers a more specialized aspect of the survey - a timber reconnaissance of the George and Koksoak Rivers.

Because the need to improve the standard of living in the area was so pressing, there was no opportunity to carry out research "in depth", and the studies in this report are best considered as "action research" studies. Time was limited, both for reading the relevant literature, and in the field.

The writer wishes to thank Mr. Jim Lotz, of the Northern Co-ordination and Research Centre, and Mr. Bruce Myers, of the Northern Administration Branch, for editing this report in its present form. The report is published primarily for use within the Department, for distribution to other interested Government agencies and for limited distribution to universities, organizations, and individuals interested in northern development.

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PART 1

The Geography and Economy of Ungava Bay in 1958

Introduction

This is a pilot study. The time spent in gathering material and writing it up was limited. This part contains no first-hand observations and all material used was taken from files, reports and studies made in the region by other people. The purpose of this section is to:

1. Provide a brief description of the settlements, climate and topography of the Ungava Bay area.

2. Provide a pilot survey of known economic potential in areas of Eskimo settlement.

3. Point out areas which are now being developed by outside interests.

4. Point out economic resources which are not being utilized.

PHYSICAL CHARACTERISTICS OF THE UNGAVA BAY REGION

Geology and Structure

The Ungava Bay area is a part of the Canadian Shield of Precambrian rocks. In Ungava, granites and gneisses of Early Precambrian or Archaean age are thought to predominate. Only jointing and faulting relieve the peneplained surface, so that for the most part, this structure gives rise to low hills; along the Hudson Strait coast steep cliffs and entrenched rivers present more rugged relief.

In the area to the south and west of Ungava Bay a north-south belt of rocks of Proterozoic (Late Precambrian) age lies at varying distances from the sea. These rocks consist of sediments and volcanics laid down in a geosyncline that lies on the Archaean rocks. This geosyncline has become known as the Labrador trough and extends more or less continuously from southwest of Koksoak and Larch Rivers north to Diana Bay. The Proterozoic rocks include both a volcanic and sedimentary group. The volcanic group lies in the more easterly position, and is composed of chloritic lavas, schist, slate, and intermediate to basic intrusions. The sedimentaries consist of quartzite, sandstone, dolomitic limestone, chert, slate, iron formations, and conglomerate.

The Labrador trough is characterized through its length by a series of ridges and valleys parallel to the general trend.

Surface Deposits

The whole of the Ungava region has been strongly glaciated. Evidences of scouring and deposition by the Pleistocene continental glaciation are widely distributed. In the areas of more than 30 per cent rock outcrop, the drift is confined to the valleys and hollows. In other areas, however, no outcrops are visible and a thick layer of drift masks the bedrock. These unconsolidated deposits consist of boulders, gravel, sand, and clay. Erratic boulders are scattered over much of the upland surface, and many of the boulders exposed on mud flats at low tide are also of glacial origin. Sand deposits are exposed along many of the rivers.

Permafrost

Permanently frozen ground probably underlies the whole of the area. At Payne River the "active layer" is 16-20 inches in depth. The permanently frozen subsoil is an important factor controlling drainage, vegetation, and any construction work undertaken in the north. Water cannot percolate downwards in the soil, and run-off is restricted to the shallow surface layer. Thus, poorly drained sections are to be found where the topography is level, whereas on sloping land solifluction is likely to be present.

Topography

In places, the topography is that of a featureless plain. Elsewhere, under the influence of faulting, jointing, glaciation, or river erosion, the terrain consists of low or even rugged hills. The surface topography has also been altered by deposits of drift to produce a hummocky terrain. Generally, however, this area is one of low relative relief.

The most rugged section within the area is along the Hudson Strait coast. Here the coast is formed of steep cliffs, and headlands rise up to 1,100 feet between deep bays. Terraced drift is found in coves at the head of bays and in valleys. Elsewhere bare rock is exposed. The rivers draining the upland surface have cut down sharply to attain sea-level, giving a topography of a rugged appearance. Lakes occupy depressions and cover a large percentage of the surface.

The rugged hills terminate a short distance inland and are replaced by a complex of low hills of drift and rock. The surface is dotted with lakes connected by short rivers, the lack of relief and glacial deposits having disrupted any pre-existing drainage. The only large river on the west coast is the Payne, whereas on the southwest coast there are several - the Leaf, Koksoak, Larch, Kaniapiskau, and Whale.

Beach lines and terraces, which are to be found along the coast and rivers, can be attributed to the influence of Pleistocene glaciation. Since the Pleistocene, the glaciated areas of North America have been slowly rising. The extent of this rise is indicated in the Ungava Bay area by the elevation of the terraces and beach lines that fringe the coast. The height of these terraces along streams indicates that a continual rejuvenation of the rivers has taken place. Marine terraces rise up to 200 feet on the banks of the Payne River, and terraces on the Larch and Kaniapiskan rise from 30 to 250 feet in height.

The topography is level to gently undulating along the central west coast of Ungava Bay. These areas, having low relative relief, are generally attributable to the concealing of the uneven rock surface by glacial or post-glacial unconsolidated materials such as drift, sand, gravel, or clay. Level deposits of unconsolidated material such as clay or sand are found along the rivers indicating former river or lake expansions or deltaic deposits. It is on such a site that the airfield at Fort Chimo is located.

Coastal Topography and Hydrography

Generally speaking, the coastal topography is low. The exception is the Hudson Strait coast west of Diana Bay where steep cliffs and long fiords and bays are to be found, and where deep water lies off-shore. Moderately high tides occur there. The mean high water at Wakeham Bay is 27½ to 30 feet at springs and 20 feet at neaps; and mean low water for the same periods is 0 to 3½ feet and 15.3 feet.

Cape Hopes Advance is situated on a rocky peninsula; the cape is 300 feet high and rises boldly from the sea.

The west coast of Ungava Bay is generally low, although even the areas shown as level may be broken by occasional hills up to 200 feet in height. Many islands fringe the shore and the tidal range is high. At low tide extensive mud-flats strewn with boulders are exposed for some distance from the shore. Navigation is hazardous because of the treacherous coast and the great tidal ranges. At Leaf Bay the tidal currents are particularly strong, the range at Leaf Lake being estimated as 54 feet at springs and 40 feet at neaps. The Canadian Hydrographic Service Chart of Leaf Bay (1953) cautions navigators against the dangerous currents and eddies that occur in the channel between Leaf Bay and Leaf Lake. The velocity of these currents has been estimated at between 10 and 12 knots at certain stages of the tides.

Boulder-strewn mud-flats fringe the southern coast, and high tidal ranges occur, although they are not as extreme as Leaf Bay; the high water at springs at the mouth of the Koksoak is 37 to 45 feet and at neaps 32 feet. The low water at springs is 0 to 8 feet. In the estuaries of Koksoak, False, and Whale Rivers off-shore reefs provide a further hazard to navigation along the coast.

Climate and Vegetation

The area to the south and west of Ungava Bay belongs to a transitional zone between the sub-Arctic and Arctic climates. The tree-line marks the boundary. There is a close link between the climate and vegetation, a mean July temperature of at least 50 degrees being necessary for tree growth.

Generally speaking, in both the Arctic and sub-Arctic, winters are long and cold and summers are short and cool. The sea has a moderating effect on coastal stations, which are several degrees warmer, in December and January, than are stations further inland. Although summers in the sub-Arctic are generally cool, an influx of warm air from the south can cause a sudden rise in temperature. Spring and autumn are short seasons, bringing a rapid changeover from the short days of winter to the long days of summer, and vice versa. The greatly increased insolation in early summer soon melts the snow and ice that have accumulated throughout the long winter.

Precipitation totals are low in both the Arctic and sub-Arctic. Somewhat higher totals are experienced with increased distance southwards, because there is a greater likelihood of cyclonic storms passing near enough to cause frontal precipitation. The maximum fall comes as rain in the four summer months from June to September. At this time the paths of cyclonic disturbances have shifted northward, a deep low-pressure area covers continental North America, and the sub-Arctic high-pressure area has moved north and covers the Arctic islands.

In winter the precipitation comes entirely in the form of snow. Totals are low but the snow remains on the ground throughout the winter, drifting in the lee of buildings and lying in hollows and other sheltered spots.

Throughout the year northwesterly winds prevail at Cape Hopes Advance. Only in July are these winds, blowing from the high-pressure centre, replaced in importance by southeast winds. The latter are strengthened at this time by the increased influence of cyclonic storms. The southeast-northwest orientation of the wind may also be due to the proximity of Hudson Strait. Average wind speeds vary throughout the year from 3 to 8 miles an hour exclusive of direction. Few calm days are experienced each year.

Fogs are common in summer and early autumn, when air that has been heated over the land blows over the cold water of Ungava Bay and Hudson Strait. Dense fog combined with bad ice conditions can be a serious navigation hazard.

The vegetation is transitional between the taiga and the tundra. The tree-line separates the taiga (or Northern Boreal Forest) from the tundra. Balsam fir is found along the Kaniapiskau and on the Larch and Koksoak Rivers for some miles above and below the junction of the Kaniapiskau. White birch is found down the Kaniapiskau and Koksoak Rivers to the limit of dense forest. Poplar occurs in the same general areas as the balsam fir. Thus the area of sparse vegetation is associated with black spruce and larch, and the denser vegetation to the south is due to the presence of white spruce and deciduous trees - poplar and white birch.

The forest is not continuous however, even south of the tree-line. Climate is not the only factor limiting the growth of trees, as varying drainage and surface conditions also determine the type of vegetation cover. The trees are found in patches and along the banks of rivers. In dry areas a few thinly scattered

and stunted trees are separated by open areas of lichens, shrubs, and mosses. In the wetter areas black spruce and sphagnum form the characteristic vegetation. Rich coniferous forest is rare so close to the tree-line, but the section along the Kaniapiskan and Koksoak may be included because of the balsam, fir and white spruce that occur there.

Both north and south of the tree-line there are large areas of bog caused by poor surface drainage. Sedges and rushes grow in these very wet sections.

Vegetation in the tundra consists entirely of mosses, lichens, and shrubs. Where snow cover affords protection the vegetation is abundant, but where the wind is strong, plants are stunted and the growth is weak. The bogs are characterized by spongy mosses saturated with water and the dry places are marked by the growth of lichens both on soil and rocks. In locations that are both well-drained and sheltered from the wind is found the so-called Arctic prairie, in which thrives a Heabaceous vegetation of biennial plants, grass, and shrubs more than 2 feet in height.

Ice Conditions

During the winter season Ungava Bay is generally completely ice-bound, with landfast ice fringing the coasts and pack ice filling the centre.

Freeze-up begins at the southern end of the bay with the appearance of landfast ice around the shores, where the water is relatively shallow. This occurs towards the middle of November. About the end of November or early December, pack ice moves in from Hudson Strait and completely fills the bay, which then remains ice-bound until the early following summer. Strong tidal action in the southern end of Ungava Bay generally delays the freeze-up in Payne, Leaf, and other small bays until well into December.

Break-up also begins in the southern end of the bay in the river mouths and inlets. By mid-June the Koksoak, Whale, George and Leaf Rivers are generally free of ice and patches of open water begin to form off their mouths. Ungava Bay is sometimes almost clear of ice by the end of July but generally large fields persist in the central part until early August. By late July navigation is possible in the open water around the sides of the bay and various trading posts can be reached. For Payne Bay, Leaf Bay and small bays and inlets at the head of Ungava Bay, the mean break-up date is June 15, but navigation is usually hindered for some time by the presence of pieces of ice that move back and forth with the tides. The navigation season, therefore, differs somewhat from the duration of time between the actual dates of break-up and freeze-up, as the following quotation indicates;

> "There is no close relationship between the break-up and freeze-up dates and the opening and closing of navigation. For instance, Payne Bay breaks up the 15th of June, but it is seldom that vessels can enter this port before the first week in July."[1]

Similarly, at Leaf River, due to tidal conditions, freeze-up may be delayed until the end of December. The Hudson's Bay Company uses as a guideline the following average break-up and freeze-up dates:

Place	Average Break-up	Average Freeze-up
Diana Bay	June 20	December 10
Payne Bay	June 15	December 5
Leaf Bay	June 10	January 1
Fort Chimo	June 6	October 30

Settlement Areas

Fort Chimo

There are two main areas of settlement at Fort Chimo: (1) the settlement proper which is located on the east side of the Koksoak River at its highest navigable point thirty miles upstream from Ungava Bay; (2) the air base which is approximately seven miles south of the settlement on the west side of the river.

Climate

Meteorological records have been kept by the H.B.C. for some time, and they indicate that Fort Chimo is in the sub-Arctic region of Canada, rather than in the Arctic, with an average mean monthly temperature of 55°F. in July and 54°F. in August. Winter temperatures have a mean monthly average of -12°F. in January and -9°F. in February. The lowest temperature recorded is -45°F.

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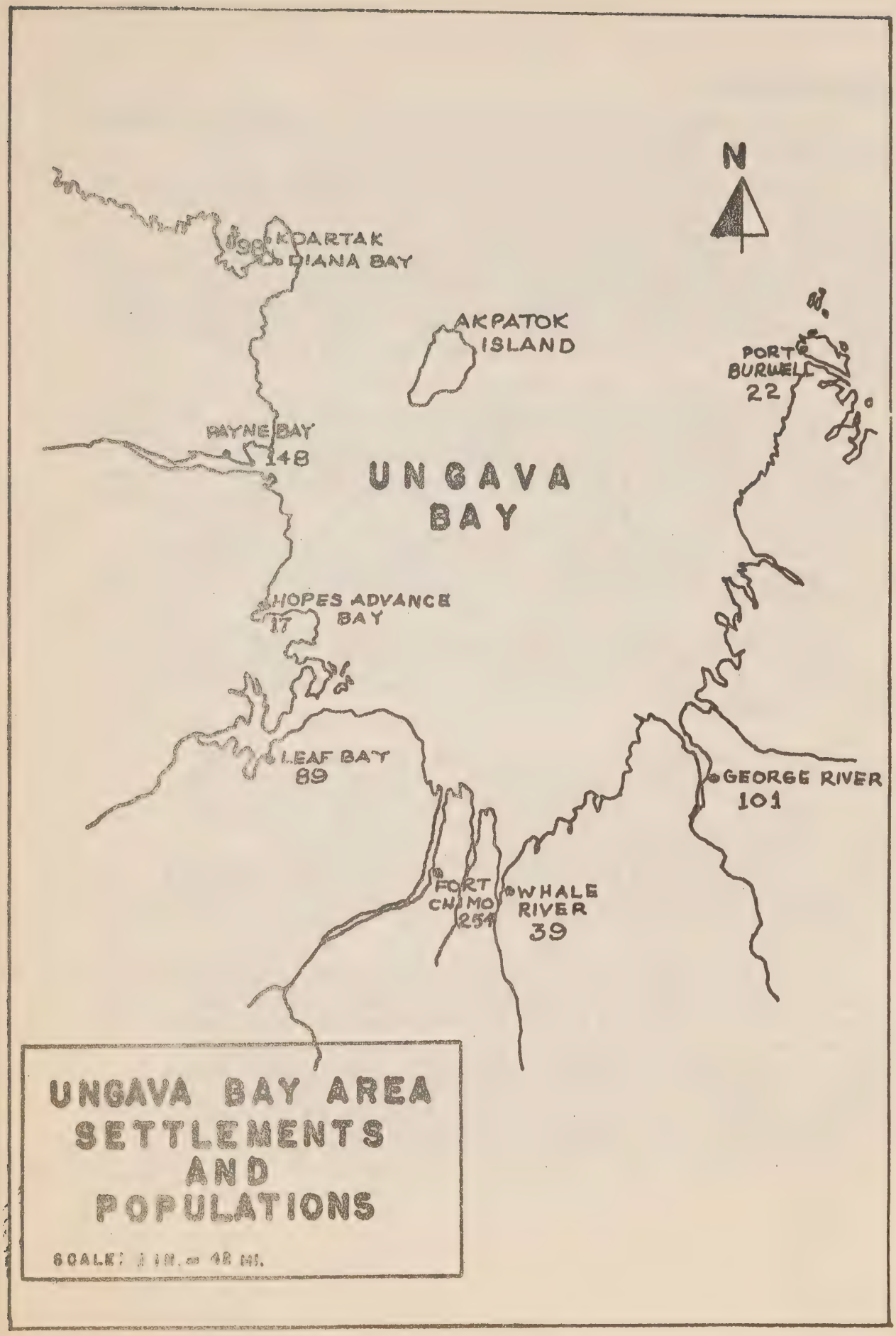
1 Drinnon R.H. and Prior L.: Physical characteristics of the Ungava Bay Area, Geographical Bulletin No. 7, Department of Mines and Technical Surveys, Ottawa, 1955. (a summary of the paper).


N
KPARTAK
DIANA BAY
AKPATOK ISLAND
PORT BURWELL
22
PAYNE BAY
148
UNGAVA BAY
HOPES ADVANCE BAY
17
LEAF BAY
89
GEORGE RIVER
101
FORT CHIMO
254
WHALE RIVER
39
UNGAVA BAY AREA
SETTLEMENTS
AND
POPULATIONS
SCALE: 1 IN. = 48 MI.

Fort Chimo Settlement

The land around the settlement is generally low with some rocky hills and small scrubby trees.

At Fort Chimo the river is approximately three-quarters of a mile wide. The post of the Hudson's Bay Company was built here, as it was a common meeting-place for the Eskimos and Indians engaged in the fur trade. It was founded in 1828, making it the oldest post in the eastern Arctic. The buildings belonging to the Company at the time of writing consisted of a store, three storage buildings, a residence and two smaller buildings. Other buildings included the Roman Catholic Church and out-buildings, an Anglican Church and a manse.

The majority of the settlement's buildings belonged to Government Departments. There was a nursing station consisting of two prefabricated huts joined by a passage-way, a teacherage, an administration building 25' x 125' with an adjoining powerhouse housing a Diesel powered AC generator, a school and four Nissen huts. At the time of writing one of the Nissen huts was used as a sheep pen, another as a poultry house and carpenter shop, and the remaining two as storage sheds. A fifth Nissen hut, which was used for storage purposes, was destroyed by fire on January 8, 1957.

Excluding three of the Nissen huts which were transferred from the airbase, all of the buildings were acquired by the Department of Northern Affairs and National Resources from the Department of Transport in October 1955.

The 1957 construction program, which was to have included five 512 Eskimo houses, was revised pending a decision as to whether or not the settlement would be moved. Accordingly, the construction program in 1958 consisted of interior changes to the administration building to provide two married quarters and accommodation for visiting staff, installation of a summer water supply system utilizing plastic pipe, repairing and extending the power distribution lines, the construction of a warehouse for the teacher, and the construction of an Eskimo house.

The living quarters of the Eskimo people at the settlement were in very poor condition. The resident Eskimo population at the settlement at the time numbered approximately 60 people. This figure, however, was swelled from 550 to 600 during the summer months when the Eskimos in the outlying regions gravitated to Chimo. These people returned to their camps in the fall. The resident white population at the settlement numbered approximately 10. However, this figure was usually increased during the summer construction season.

Fort Chimo Air Base

The air field and base were built in 1942 by the United States Air Force. The hard-surface air-strip was one of several built as part of the Crimson Air Stage Route.

In post-war years very little work was done on this air-strip although it is used extensively by Mont-Laurier Aviation Company, and more recently by Nordair Limited in their flights to Frobisher Bay. It is also used as an emergency landing strip by the R.C.A.F.

A number of Government buildings are located at the Air Base. These include the Department of Transport Radio and Weather Station, the R.C.M.P. post and a hostel and storage shed belonging to the Department of Northern Affairs. A Roman Catholic Chapel and the headquarters of Mont-Laurier Aviation Limited are also located at the base.

In 1958, the permanent Eskimo population numbered close to 20, nearly all of whom were dependent upon wage employment. In addition to this, approximately 15 white personnel were stationed at the base. These included a Roman Catholic priest, an R.C.M. Police Officer, a representative of Mont-Laurier Aviation Limited, and approximately 11 technicians who operated the Department of Transport radio station.

Re-location of Chimo Settlement

The question as to whether Fort Chimo settlement should be moved to the base side of the river or remain in its present location has been discussed from time to time.

The base side indeed has advantages which are lacking at the settlement: the base is the communications centre, which is important for efficient administration; greater proximity to the landing-strip, located at the base, would aid in the evacuation of Eskimos to the south for medical treatment: the base offers ample room for expansion should the need arise in the future; and re-location of Government services and the Eskimos would provide an opportunity to improve the living accommodation of these people.

The main argument against the re-location of the settlement is that the east side of the river has been the traditional camping ground of the Eskimos and Indians. A move to the other side of the river may be disadvantageous to the Whale and George Rivers and Burwell Eskimos when travelling to Chimo, although an extra seven miles by boat in the summer or by dog team in the winter should not present great inconvenience.

With the development of mining in Ungava, the air base is assuming great importance as a transportation and communication centre. The decision as to whether or not the settlements should be re-located should be made soon while desirable building sites are still available.

Port Burwell

Port Burwell is situated on the southwest side of Killinek Island separated by McClelan Straits from the mainland. The country adjacent to the harbour is rugged. In many places steep rocky cliffs rise from the water. The hills near the settlement attain a height of 100 to 500 feet.

In 1884 the Dominion Government Meteorological Expedition opened a station at Port Burwell. The station was closed in 1886 but was reopened by a Newfoundland Trading Company in 1898. The Moravian Church established a Mission and Trading post in 1900. The settlement remained a Mission Centre until 1915 when the Hudson's Bay Company took over the old trading buildings from the Mission. In 1925 the Moravian Mission closed and the Hudson's Bay Company bought their buildings.

The R.C.M.P. placed a detachment at Burwell in 1920 to collect customs from vessels entering Hudson Bay. The police detachment was moved from Burwell in 1935 and in 1940 the Hudson's Bay Company closed their post. At the present time twenty to twenty-five Eskimos live in the area.

Climate

Meteorological records were kept for a short period from 1927-28 and have since been continued from nearby Resolution Island. Because of its location near the Labrador Current, summers are quite cool, but on the other hand, the nearby open water causes relatively mild winter temperatures. Fog is quite frequent during the summer. In the spring the harbour is frequently blocked by fields of ice which drift in and out of the entrance of Hudson Strait with the inflow and outflow of the tide.

George River

This post, which was established in 1838, is situated on the east side of the George River. The post was recently abandoned, and now a small camp outpost is maintained by an Eskimo assistant manager.

Koartak

This small settlement is situated on the east side of Diana Bay. Around the settlement the land is generally low, with some rocky hills. The only buildings found here in 1958 are those belonging to the Roman Catholic Mission. These include a Mission House and two warehouses. One or two Eskimo families usually camp close to the Mission, but the main Eskimo settlement is six miles northeast of the Mission. There are roughly 100 Eskimos living in the area. Radio communication is maintained by the two priests who operate the Mission.

Payne Bay

The settlement of Payne Bay is situated in a small bay on the western side of the Payne River, 10 miles from the sea coast. Around the settlement the land is generally low, but rises sharply to a plateau immediately behind. Supply ships anchor two to three miles down river from the post and transport their goods the remaining distance by barge. The majority of the buildings in the settlement belong to the Hudson's Bay Company. These include the post manager's house, the Eskimo assistant's house, three warehouses and an oil shed. The Hudson's Bay Company also maintains a floating dock on the river. Other buildings in the settlement include a combination warehouse and living quarters owned by Quebec Streams and a building owned by the Department of Northern Affairs which also serves as a combination warehouse and living quarters. A number of small Eskimo dwellings are scattered throughout the settlement. Radio communication is maintained by the post.

ECONOMY

General

The economic problems that exist in Ungava Bay are exceedingly complex. The original native economy has been completely disrupted, and the Eskimos have become so dependent on the white man's trade that they have lost their original arts of hunting and travelling. The people tend more and more to collect at the posts, especially Fort Chimo. Their diet contains too high a proportion of store food - white flour, lard and tea. The general standard of health is poor and initiative and morale is correspondingly low. The low state of energy and enterprise results in reduced hunting and fishing activity. This combined with the feeling that "The Government owes us a living", forms a depressing picture. The reduced activity in hunting in turn reflects upon the initiative of the native and so the process is circular and spiralling downward.

Timber (see Part III)

Three relatively large stands of timber are found on the east coast of Ungava Bay in the valleys of the Whale, Koksoak, and George Rivers. The largest of these is the George River stand. Black spruce and tamarack are the predominant species, the heavier stands being found in close proximity to the rivers. The trees are all stunted and taper very sharply. At the present time very little of this timber is being utilized. The Eskimos cut approximately 50 sets of komatik runners each year for sale to the Hudson's Bay Company, who in turn distribute them to their posts above the tree line. A certain amount of timber is also used for fuel. The trading company of the Revillon Freres established a small boat-building industry at Fort Chimo around the turn of the century, but this project was abandoned in 1938 when the company sold their post to the Hudson's Bay Company.

With the development of mines in this area it may be possible to establish a small logging industry. Underground mining requires a large amount of timber for cribbing, wedging, timbering, and to provide ties for the narrow gauge railways. The timber that is used for this purpose is of low grade and only short lengths are required. The iron mines plan to use an "open pit" system of mining and, consequently, will not have a great demand for rough timber.

Before serious thought can be given to the development of this industry, the following points should be considered:

1. A cruise of the timber resources of the Koksoak, Whale, and George Rivers should be made.

2. The timber resources of this region come under the jurisdiction of the Quebec Provincial Government. They would have to establish regulations covering -
   (a) Where the timber could be cut
   (b) Size of the annual cut

3. Mining companies should be approached to see if they will purchase this timber and, if so, at what price.

4. Arrangements for transporting the timber from the cutting site to the mines should be investigated.

5. The general economics of the program should then be worked out and if they prove feasible, plans should then be laid for establishing a small industry. In conjunction with the sale of timber to mining companies, it may be possible to increase the production of komatik runners and to utilize the timber locally for Eskimo house construction and boat building.

Many of the Eskimo houses lack proper furnishings, and undoubtedly this timber could also be used to provide rough furniture.

Fishing

Traditionally, fish have always provided a minor source of food to the Eskimos of Ungava Bay. However, with the depletion of other game resources in this region, fish may play a very important part in the establishment of a sound economy.

(a) Salmon

The Atlantic salmon are caught as far west as the Koksoak River. They run between late July and the third week of August and are usually caught in nets. The run is variable in extent, and, therefore, unreliable as a source of food for men or dogs. The present annual catch on the Koksoak River varies between 3,000 and 12,000 pounds. The catch on the Koksoak in 1947 was roughly 10,500 pounds, but in 1948 it had declined to 3,600. It is possible that the salmon fishery was damaged by commercial fishing which was begun in 1881 by the Hudson's Bay Company and continued until the 1930's. Both the total catch and the average weight began to decline as soon as the fishery opened. About 40 tons of fish were frozen for shipment in 1881, average weight 19 pounds; 24 tons in 1882, average weight 16 pounds; 38 tons in 1883, average weight 14.5 pounds.

Another attempt was made to establish a salmon fishing industry in 1954. This scheme was developed by two men employed at the Fort Chimo air base. They paid the Eskimos and Indians 10¢ a pound for salmon caught in the Koksoak River. The fish were shipped out on aircraft returning to Montreal or Roberval. The plan collapsed because adequate refrigeration facilities were not available and many fish spoiled between flights.

(b) Arctic Char

The Arctic char occurs in all large rivers in the area. In the southern part it is replaced in some of the smaller streams by the speckled trout. During the upstream migration, char are caught in gill nets and with long pole gaffs. They are also caught in much smaller numbers in lakes during the winter. They do not

support as important a fishery as do the salmon, no doubt because the latter is larger and therefore the more valuable fish to the Eskimo. The char could be subjected to considerably greater fishing by the Eskimo if their activities were spread over a large number of streams, many of which are hardly touched at the present time. Extensive fishing on one river, however, would probably deplete this resource.

At Port Burwell, there is a possibility of establishing a large marine fishery. Here, in the form of cod and shark lies the largest potential food resource in Ungava Bay. At the present time, this food is not being utilized at all.

(c) Atlantic Cod

Atlantic cod spend some 10 weeks in the Burwell area from the latter part of July to the end of September. The cod are fairly small ranging up to 75 centimetres in length, but they can be caught at the rate of 20 fish per man hour. The Greenland shark is common and could also be used. The Eskimos have never learned the value of the liver or used the dried flesh for dog food.[1]

In 1950, the Department of Resources and Development set up an experimental fishing project at Port Burwell.

An experienced fisherman, equipped with three dories and sufficient food to pay the Eskimos for their services in kind, was sent north and stationed for three months at Port Burwell. It was impressed upon the Eskimos from the outset that they would be helped to develop this fresh source of food in every way possible, provided they showed a willingness and ability to handle the new equipment, and make the best use of it.

When the instructor-fisherman arrived at their camp, they showed themselves grateful for the interest and displayed a keen desire to follow the instructions.

By the end of the season's operations, results indicated that the Eskimos could catch far more fish than they could use.

The Eskimos did not continue to fish cod once the test had been completed. However, this resulted from the fact that Port Burwell also provides one of the best sealing grounds in the Arctic and cod were not needed for food.

It is interesting to note that the Eskimos in Greenland and Labrador have not developed marine fisheries to any significant degree by themselves, but only with the initiative and help of the white man. Where marine fisheries have been developed, they have

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[1] Dunbar M.J.: The Ungava Bay Problem, Arctic V. 5, No. 1, March, 1952, p.4 - 16.

proved of vital importance to the native, especially in west Greenland, where the cod fishery is now the largest single industry.

It is evident that fish is one of the large food resources not being used in Ungava. There is a need for a cod fishery at Port Burwell which would provide salted, frozen or possibly dried fish for distribution to other points along the coast. Such an enterprise would require careful planning and provision would have to be made for:

1. The establishment of a maximum catch by the Fisheries Research Board.

2. The development of an economical method of preserving the cod (e.g. drying, smoking, freezing, salting)

3. Purchase of adequate fishing boats (As the fishing is done fairly close to the shore, a small dory type of craft would be adequate.)

4. Transportation of families to Burwell from other areas to take full advantage of the short fishing season.

5. Distributing the fish to the settlements.

Shark fishing could be undertaken at the same time at Port Burwell. As the high ammonia content of the meat disappears when dried, it could be cut into long strips, dried in the open air, packed in seal oil and used as dog food. Shark skin could become a useful by-product of such an industry. The Greenlanders treat it with a preservative and ship it to Europe to be tanned. The leather is durable, does not tear and can be split into a suede.

Salmon and char fishing activities could also be increased to the point where they would make a substantial contribution to the economy. These fish could be used to provide either native food or a cash income.

The system of harvesting the char and salmon resources would have to be carefully organized. A seasonal limit would have to be set for each river and stream so that over-fishing would not deplete the supply. This would necessitate spreading fishing operations over a large number of streams. The most economical

method of doing this would be to have small groups of people concentrate on fishing a number of rivers in one area. Their catches could be picked up several times during the season.

Some method of preserving the fish would have to be arranged. This could be done economically by smoking or drying or by using small portable freezing units.

Two cash markets will probably develop for char and salmon. With the extension of reliable air services, it is now possible to ship fresh or frozen fish to Montreal without danger of spoilage because of delay. The local market should grow as mining companies are established in the area.

Mining

Two general belts of mineralization have been discovered in Ungava. The Labrador Trough, which begins in the Wabush Lake area of Labrador and stretches 550 miles north to Diana Bay contains one of Canada's largest known iron ore potentials. The Ungava nickel belt, which is approximately 225 miles long and stretches from Wakeham Bay in the east to Cape Smith in the west, has given indications of developing into a rich nickel producing area.

Mining companies interested in potential iron deposits in the Ungava Bay area in 1958 include Oceanic Iron Ores, Consolidated Fenimore, Atlantic Iron Ores, and International Iron Ores. Deposits of medium grade iron ore in this area are estimated at 500,000,000 tons.

The greatest obstacle to mining developments in this area is the high cost of transportation. Exploration and initial operating costs are extremely high due to the high cost of bringing in equipment. Because of these high costs, at least two of the interested mining companies have indicated that they would build smelters and docking facilities in the area as the cost of shipping unsmelted ores to the south would be prohibitive. The high cost of travel, the isolation and the high cost of living result in high labour costs. This, however, may be partially offset through the employment of local Eskimo labour in some of the unskilled jobs. At the present time the Department of Northern Affairs is operating a vocational training program for Eskimos, and as these people return to the north, they will be able to assume jobs of a semi-skilled nature.

One other deterrent to the development of mining is markets.

Electrical power for smelting operations is necessary, and the Quebec Streams Commission will provide the necessary dams for power stations for any development of ore deposits of high value.

Thirty-two applications for development in the Ungava Nickel belt had been approved at the time of the study. The most advanced project in the area was for an electro magnetic survey that is being conducted along the relatively narrow stretch of favourable sedimentary and volcanic deposits. This was a joint effort supported by most companies holding concessions in the area. Spartan Air Services were undertaking the survey, which was to cover some 3,000 to 4,000 square miles on the central section of the nickel belt.

A main base camp and an air strip were established at Esker Lake. The latter, complete with beacon and radio finding equipment was planned to handle the large transport planes required to operate economically in the area. The gravel airstrip, which has a length of 5,000 feet and a width of 150 feet, was completed in the summer of 1957.

The future of the mining industry is very uncertain. However, as it develops, it will contribute a great deal to the economy of the region. As the mines will undoubtedly employ a large number of Eskimo labourers, pressure on the game resources will be reduced. This in turn will raise the standard of living of those who wish to remain on the land.

Sea Mammals

Sea mammals, though present, are not abundant in Ungava Bay. Furthermore, the good hunting season is very short - about three weeks in June and July between the break-up of the ice and its disappearance from the bay. The seal, especially the ringed, leave with the ice and only a small proportion of the bearded and harp seal remain in the open water of the bay. However, the numbers that remain are not so small that an energetic family cannot make good kills. In 1947 a camp of five families with two peterhead boats landed 75 ringed seals and 42 square flippers in a period of about three weeks in late June and early July. Walrus are also hunted at Cape Hopes Advance during the latter part of June. In 1956, 20 walrus were killed here. Walrus also congregate on Akpatok Island in fairly large numbers during this same period. Large ice concentration in the Bay at this time often prevents hunters from reaching Akpatok before the walrus leave.

During the latter part of August white whales are found in most of the rivers. Generally, they do not occur in large numbers, but a group hunt can often produce a large proportion of the winter's dog food. In 1956 a hunt at Koartak produced 78 whales.

The winter hunting conditions on the ice are very unsafe, owing to the large tidal range and the strong pattern of currents; consequently, there is little seal hunting at this time.

Biologists are not sure whether there has been actually a decline in the sea mammal population in Ungava Bay or whether these waters have always had such a low productivity. It is possible that the recent warming of the waters of the Atlantic sub-Arctic, which has so strongly influenced the west coast of Greenland, has caused a reduction of the sea mammal population in Ungava Bay.

If any reduction has taken place, it has undoubtedly been partially affected by the use of the rifle by the Eskimo. Members of the four "Calanus" expeditions into Ungava Bay made observations of Eskimo hunting habits. They concluded that for every seal landed during the summer, three were lost owing to sinking. Such a waste has undoubtedly helped to reduce the sea mammal population.

Although sea mammal hunting in Ungava is generally poor, Port Burwell provides extremely good hunting. Burwell is on the route of the harp seal migration to Newfoundland in October to November. This migration alone provides the natives of this region with enough meat for the whole year. Wildlife experts estimate that 3,000 additional harp seal could be taken from this area without endangering the continued supply. Burwell also lies close to the Button Islands, which can usually be relied upon to provide good seal hunting throughout the open season. Ring seal, harbour seal, harp seal and square flippers all can be taken in the summer at the Button Islands, although the shortage of good boats makes the number of native visits rare. The waters in the immediate vicinity of Burwell itself also appear to be richer in seals than the remainder of Ungava Bay.

Greater utilization could be made of some of the sea mammal resources. Wildlife biologists estimate that an additional 150,000 pounds of seal could be taken at Port Burwell each year without depleting the resources. As the harp seal migration takes

place about two weeks after the cod fishing ends, it is possible that the two projects could be arranged so that the people engaged in fishing could move directly to seal hunting once the fishing season was over.

Organized hunts could also be made to kill walrus on Akpatok Island in the early summer and to secure white whale in the river mouths during the summer. All these hunts require planning, equipment and some provision for exchanging the products that each group is able to secure.

Boats

At the present time twenty boats are maintained by the Ungava Bay Eskimos. As much of the bulk transportation and summer hunting are undertaken by whaleboat or Peterhead, it is evident that boats perform a very important function in the economy.

Number	Type	Condition		
		Good	Fair	Poor
14	Peterhead	4	2	8
4	Open Motor Boats	1	2	1
2	Whale Boats	2		

As can be seen from this table, nearly one half of the boats need to be replaced or require major repairs.

The Peterhead boat has many limitations. The initial cost is high (approximately $5,000.00) and it is very expensive to operate. Taking into consideration initial cost, depreciation, maintenance and operating expenses, it costs well over $1.00 per mile. The fact that over one half of the Peterhead boats are in poor condition is an indication that the Eskimos in Ungava Bay do not earn enough money to purchase and maintain a Peterhead boat in satisfactory running order.

The development of a sound economy among these people will depend to a large extent upon full exploitation of existing resources, plus an economical method of distributing and exchanging the products of each group.

There are two general ways of providing a good local transportation system. First, a small schooner could make one or two trips along the coast transporting people to work sites and later returning them home and distributing their produce. On the other hand, a number of small, economical and efficient boats, capable of carrying two - three tons, could provide the same service. The latter would probably be the most desirable as they could be owned by the Eskimos and chartered by others when necessary.

Caribou

Caribou are a minor source of food for the Ungava Eskimos. Around the turn of the century the caribou became less and less numerous in the coastal regions. Shortly after this, settlements in Labrador

reported a large increase in the caribou population. This may indicate that the decline in the number of caribou in the coastal regions of Ungava has been due to a change in the migratory routes of the animal. A survey made in 1955 by the Canadian Wildlife Service indicated that caribou foods in the region were abundant, and that there was no indication of range restricting caribou numbers. Recent reports from the region indicate that caribou appear to be more numerous than in former years, particularly in the Leaf Bay and Larch River area. Eskimos report sighting herds of 200 or more.

Wild Fowl

Wild fowl do not provide a major source of food for the Eskimos in Ungava. Ptarmigan are shot the year round in small numbers and geese and ducks are secured during the summer months.

On Akpatok Island there is a large potential source of food. Here an estimated one million murres nest each season. Though the birds are small, weighing from 1½ to 2 lbs., they have an excellent flavour. In Greenland these birds are hunted commercially, and the breasts are canned and sold as a delicacy.

Eider Ducks

The eider duck is protected in Canada by the Migratory Birds Convention Act. Where the eider lives in Eskimo territory, populations have declined. The long-term decline in eider duck numbers is ascribed to increased pressure on eiders by Eskimos because of decreased numbers of caribou, the sedentary habits of many Eskimos, and the use of eggs as food. Undoubtedly, the decline of other wild life forms has resulted in an increase of activity by predators on eider colonies.

In 1954, an aerial survey of eider duck colonies was carried out in Arctic Quebec by the Canadian Wildlife Service.

It was decided, on the basis of all the enquiries, that the Arctic Division as it then was, would attempt to introduce conservation and management practices in a practical experiment at Payne Bay.

At Payne Bay it was found that eiders form an important part of the economy of the local Eskimos. All families in the area have eiderdown comforters and many children and hunters have eiderdown clothing.

In the winter of 1956, organized manufacture of textiles was started at Payne Bay. This had two purposes. The first was to stockpile garments which could be sold to mining people, during the busy summer season, and the second was to accustom the Eskimos to using suitable, and to them unusual, materials for eiderdown garments. Value of goods manufactured in the winter of 1956 and 1957 is estimated at a conservative figure of $2,500 exclusive of private sales by Eskimos.

Conservation and management of eider ducks, under the Act, cannot be carried on yet by Eskimos without supervision. They cannot on their own initiative, without encouragement, guidance and protection, develop an industry by themselves. It has been shown that the industry can produce highly desirable products, but it will require further experimental work and intensive effort before it becomes self-supporting.

Fur Trapping

Fur production in Ungava is low. This is mainly due to the fact that it is basically a poor fur production area, but it may be attributed partly to the fact that many Eskimos in this area are not interested in trapping. The 1956 results, which are tabulated below, give a rough indication of the size of the industry:

Fort Chimo (including Whale River and Leaf Bay)

173 white fox
20 red fox
2 silver fox
2 blue fox
6 mink
5 otter

Number of trappers - 81
Total income - $1,890.00

George River

6 white fox
3 red fox
14 squirrels
21 ermine
113 muskrats
9 mink
7 otter

Number of trappers - 35
Total income - $525.00

Port Burwell

34 white fox
1 ermine
11 seal

Number of trappers - 6
Total income - $565.00

Payne Bay

55 white fox

Number of trappers - 96
Total income - $468.00

The prospects for fur trapping in Ungava appear limited. It is a static industry capable of little or no expansion. It is possible that an even greater decline will develop in the future as the production of low price synthetic fabrics increases.

Agriculture

In the summer of 1953 preliminary surveys were made in the Fort Chimo area of Ungava Bay by the Federal Department of Agriculture. The results of the survey were quite encouraging - an abundance of summer browse was found available and a number of areas discovered which were suitable for the cultivation of hay and grain. On the basis of these tests, a number of experiments in animal husbandry and horticulture were undertaken.

Sheep

In July 1955 ten Suffolk sheep were sent to Fort Chimo. These sheep were supplied by the Federal Department of Agriculture, and the Department of Northern Affairs assumed the responsibility of feeding and caring for the animals. The animals were pastured on the False River until the early part of October, at which time they were returned to the settlement, and all but three of the ewes were slaughtered. The lambs averaged a dressed weight of 45 lbs., which is somewhat better than the average for southern Canada. Each of the ewes kept over the winter provided twin lambs the following spring. Because of the danger of dogs and wild animals attacking sheep, Eskimo herders were hired to care for the animals.

Poultry

In the spring of 1956 the Federal Department of Agriculture shipped 106 chicks and 35 goslings to Fort Chimo. Fifty hens were kept over the winter and it was found that eggs could be produced at a cost slightly less than $1.00 per dozen - a price comparable to the cost of imported eggs.

The results obtained in raising geese were encouraging. The birds, which were pastured on the False River Flats, produced 12 to 15 pounds of meat by the middle of October.

Horticulture

The major limitation of any horticultural program undertaken in this latitude is the exceedingly short growing season. Lajoie has established the vegetative period in this area at 99 days. Only fifty of these are frost free.

Horticultural experiments were carried out in 1955-56. Plots were prepared and seeded to vegetables, grasses and cereal grains. Results from the vegetable plots were not too encouraging. However, the tests of cereals indicated that barley and oats could be grown quite successfully. The Department of Agriculture plans to continue their experiments with grain and vegetable crops with the view to developing early maturing varieties. They also plan to investigate methods of protecting vegetables from killing frosts.

While the tests in animal husbandry have indicated that it is possible to maintain sheep and chickens in this region, it is doubtful whether they will have any economic significance until such time as it is possible to produce the bulk of winter feed locally. On the other hand, geese, which can produce 12 to 15 lbs. of meat in one summer, have a definite economic potential. If continued experiments in horticulture indicate that it is possible to produce substantial amounts of feed grain, this in turn will affect the development of the animal husbandry program. The vegetable plots may develop to the point where they will provide a supplementary source of food, but it is doubtful if they will ever make a substantial contribution to the economy.

Tourism

A small tourist fishing camp was established on the George River in the summer of 1956. This camp, which is known as "Arctic Anglers", was organized by Mr. W.L. Littleford of the Bell Helicopter Company. During the first season of operation two 4-men parties

visited the camp. The "Anglers" were all wealthy business men from the United States, and the high rates which have been established by "Arctic Anglers" indicate that their business will be based upon this type of clientele. The organization plans to publicize their venture and to enlarge their accommodation facilities.

Although tourism contributes very little to the economy of Ungava Bay at the present time, there are indications that this trade will be expanded.

Fort Chimo possesses a good airfield and is one of the relatively accessible Arctic centres. The fare from Montreal is not prohibitively high. A small sport fishing industry has already developed on the George and Koksoak Rivers. There is every indication that as this area becomes known for its sport fishing, the industry will grow. There is also a possibility of using hunting as a means of developing a tourist industry. If game laws were relaxed, walrus hunting at Akpatok Island could contribute to the cash economy of the area and the meat would still be utilized by the Eskimos. Seal could provide a similar source of income. Game birds, especially geese and ducks, are abundant during the late summer. However, they usually start their flights south by the time the hunting season has opened. If the game laws could be changed to permit shooting during the time the birds are in the area, duck and goose hunting could help develop the tourist industry.

Handicrafts

In July 1955 an experimental handicrafts project was initiated at Fort Chimo. A Technical Officer from the Department of Northern Affairs and National Resources assumed responsibility of supervising this project. The primary aim of this project was two-fold:

1. To develop skills and specialized techniques which would provide a sense of satisfaction and pleasure - and at a later date provide economic return. (This was considered especially important for the Fort Chimo people who formerly made everything by hand, but who, since the introduction of manufactured goods, had done less and less for themselves and so were gradually forgetting their old techniques of manufacture.)

2. To provide ways of greater utilization of available natural resources for use in handicrafts work. (This involved such projects as the spinning and weaving of dog wool and fox hair and the tanning of sealskins.)

Unfortunately, due to staff shortages, close supervision of this project was impossible. As a result, only a few of the Eskimos continued to work regularly at handicrafts. Although a certain amount of progress was made, the project did not reach the point where it could be continued by the Eskimo people themselves without outside supervision.

In 1955 a small commercial handicraft project was undertaken at Payne Bay. A small craft centre was erected through the joint efforts of the Hudson's Bay Company and the Department of Northern Affairs. The Department paid the Post Manager's wife a small salary to supervise the sewing. The Eskimo women were encouraged to sew garments which were bought and stock-piled by the Hudson's Bay Company.

This project was discontinued in the spring of 1957. One of the main reasons for this was that the Eskimo women did not want to sew under direct supervision. At the time of writing, garments were being made individually and sold to the Hudson's Bay Company.

If mining continues to develop in this region, there will undoubtedly be a large market for handicrafts. However, before this industry can be developed on a sound economic basis, the Eskimo must learn the value of producing standard quality products. There is also a need for a continuing program, similar to the one started in 1955 at Fort Chimo, to experiment with the utilization of indigenous materials and to explore the possibilities of marketing the products.

Social Assistance

(a) Relief

The responsibility for the relief of destitute Eskimos in northern Quebec rests with the Department of Northern Affairs. However, the actual administration of relief has been delegated to the R.C.M.P. When relief is applied for by an Eskimo, the R.C.M.P. enquire into the applicant's circumstances and upon being satisfied that relief is necessary, issue an order on the local trading store for the goods required. At places such as Payne Bay where there is no R.C.M.P. detachment, the Hudson's Bay Company Manager has been authorized to issue relief.

Relief costs have risen tremendously in the last two years as can be seen in Table No. 1 listed below:

Table No. 1

1945-46	-	$ 2,347.55
46-47	-	2,542.16
47-48	-	3,204.72
48-49	-	7,834.02
49-50	-	10,702.98
50-51	-	29,101.45
51-52	-	25,465.16
52-53	-	37,307.30
53-54	-	28,604.89
54-55	-	38,680.99
55-56	-	41,000.00 (approximately)

Table no. 2 gives a seasonal indication of temporary and permanent relief issues in Ungava Bay:

Table No. 2

UNGAVA RELIEF

	April 1956	July 1956	Oct. 1956	Jan. 1957
Number of temporary applications	116	49	133	22
Amount of temporary relief	$4,577.09	$706.31	$8,170.17	$382.04
Number of permanent applications	100	41	174	50
Amount of permanent relief	2,742.50	681.67	4,287.07	949.79
Total number of applications	216	90	305	72
Total Relief	$7,319.59	$1,387.98	$12,457.24	$1,331.83

Table No. 3 is a composite of relief figures for the four months indicated in Table No. 2 and shows the breakdown of relief between Fort Chimo and Payne Bay.

Table No. 3

	Fort Chimo	Payne Bay	Total - Ungava Bay
Number of temporary applications	206	110	316
Amount of temporary relief	$11,765.63	$2,069.98	$13,835.61
Number of permanent applications	200	165	365
Amount of permanent relief	4,938.71	3,722.32	8,661.03
Total number of applications	406	275	683
Total Relief	$16,704.34	$5,792.30	$22,496.64

These tables indicate that if full wage employment were available, a 62% reduction in relief would result. On the basis of $40,000.00 relief costs, this would result in a yearly saving of $25,000.00.

(b) Family Allowances

The responsibility of issuing Family Allowances to the Eskimos in this region has been undertaken by the R.C.M.P. All payments are made in kind from the local Hudson's Bay Company posts. A certain level of control is exercised over the spending of Family Allowances to ensure that the money is used to supply the needs of the children. A table showing the value of goods issued is listed below:

Year	Number of Families	Number of Children	Amount
1953-54	125	305	$20,753.21
54-55	121	282	25,288.39
55-56	118	268	29,690.16
56-57	125	303	22,303.25

Labour Force

The potential Eskimo labour force of Ungava Bay is listed below by settlement areas and includes all able-bodied males over the age of 16:

Fort Chimo	- 81
George River	- 35
Port Burwell	- 6
Payne Bay	- 96
Total	- 218

TRANSPORTATION AND COMMUNICATION

Transportation facilities, particularly air traffic, have improved considerably in the last ten years. No surface transportation routes exist in Ungava, and all mail and freight movements are made by coastal vessel or by air. The following outline indicates the principal pattern of transportation and communication in the area, as it was in 1958.

Water Transportation

By mid-July navigation is usually possible in the open water around the sides of the Bay, though fairly large fields of ice generally persist in the central section until early August. All commercial freight transport in the Bay is carried by Hudson's Bay Company vessels or by private charter. A number of Department of Transport ships also make calls, but they are not permitted to carry commercial freight. The itinerary for ships calling in Ungava Bay during the 1957 shipping season was as follows:

Ship	Sailing From	Departure	Port of Call	Arrival	Departure
C.G.S. "C.D. Howe" (DOT)	Montreal	June 27	Koartak	August 3	August 4
C.G.S. "Edward Cornwallis" (DOT)	Montreal	July 10	Koartak	July 21	July 21
C.G.S. "N.B. MacLean" (DOT)	Montreal	June 26	Cape Hopes Advance	July 5	July 7
M.V. "Rupertsland"	Montreal	August 2	Fort Chimo	August 11	August 13
			Cape Hopes Advance	August 14	August 15
			Payne Bay	August 16	August 19

Cost of transporting freight from Montreal to Ungava was $60.00 per ton during the 1957 shipping season.

Air Transportation

With the exception of a very few people who travel by ship during the summer, all passenger traffic goes by air. A good deal of freight and express moves in the same way. Air transport has also played a very large part in transporting prospectors and their supplies into the more remote areas. In 1958 Nordair was the only airline with regularly scheduled flights to Ungava. These flights, which originated in Montreal, stop at Fort Chimo before proceeding north to Frobisher Bay. During the summer, when passenger traffic was heavy, the company operated two flights per week (Tuesday and Friday), but during the winter this was cut to one flight per week (Wednesday). Passenger and freight rates were as follows:

Passenger - Montreal to Fort Chimo

Single	$114.00
Return	205.20

Express - Montreal to Fort Chimo

46.5¢ per pound

Freight - Montreal to Fort Chimo

Under 1,000 lbs.	1,000 to 5,000 lbs.	5,000 to 10,000 lbs.	Over 10,000 lbs.
29¢ per lb.	27¢ per lb.	25¢ per lb.	23¢ per lb.

Several chartered aircraft companies also operated in the Ungava region in 1958. These included:

1. Austin Airways Limited

   Bases: Moosonee
   Ferguson Lake
   Licences: 3 and 4 A,B,C.

2. Trans-Labrador Airways Limited

   Bases: Mont Joli
   Schefferville (Knob Lake)
   Licences: 4 A,B.

3. Wheeler Airlines Limited

   Bases: St. Jovite
   Montreal
   Licences: 3 and 4 A,B.

4. Northern Wings Limited

   Base: Seven Islands
   Licences: 2 and 4 A,B.

5. Dorval Air Transport

   Base: Dorval
   Licences: 3 and 4 A,B,C.

6. Canadian Aircraft Rentals

   Bases: Montreal
   Roberval
   Licences: 3 and 4 A,B,C.

Classification of Air Carriers

Class 1 - Scheduled Air Carriers

Air carriers who offer public transportation of persons, mails and/or goods by aircraft, serving designated points in accordance with a service schedule and at a toll per unit.

Class 2 - Regular Specific Point Air Carriers

Air carriers who offer public transportation of persons, mails and/or goods by aircraft serving designated points on a route pattern and with some degree of regularity, at a toll per unit.

Class 3 - Irregular Specific Point Air Carriers

Air carriers who offer public transportation of persons, mails and/or goods by aircraft, from a designated base, serving without any degree of regularity points within a defined area or a specific point, or specific points, at a toll per unit.

Class 4 - Charter Air Carriers

Air carriers who offer public transportation of persons and/or goods by aircraft from a designated base, at a toll per mile or per hour for the charter of the entire aircraft, or at such other tolls as may be approved by the Air Transport Board.

NOTE:

Class 4 Charter air carriers are divided by the Air Transport Board into three groups as follows:

Group A: Class 4 air carriers who operate one or more aircraft each of which has a disposable load in excess of 6,000 pounds.

Group B: Class 4 air carriers who operate one or more aircraft each of which has a disposable load in excess of 1,100 pounds but not greater than 6,000 pounds.

Group C: Class 4 air carriers who operate one or more aircraft each of which has a disposable load not greater than 1,100 pounds.

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Mail Services

Mail was carried by aircraft weekly from Montreal to Fort Chimo by Nordair Limited. Mail for Payne Bay was also carried on this flight, but the Post Office Department did not

guarantee frequent service between Chimo and Payne Bay. During the summer navigation season, the Hudson's Bay Company ships may carry mail to their ports of call.

Radio Communication

The main Radio Communication Centre for Ungava Bay was located at Fort Chimo, and was operated by the Department of Transport. Private sets were also operated at Koartak, Payne Bay and numerous mining centres.

CONCLUSIONS AND RECOMMENDATIONS

Consideration should be given to the development of Ungava Bay as an economic unit. Areas, such as Port Burwell, are not utilizing the natural food resources fully while other areas, such as Fort Chimo, are not capable of providing a sufficient amount of food to feed the people living in the area. George River has a relatively large amount of timber, yet very poor standards of housing are found at Fort Chimo. There is a need to integrate the supply of natural resources to the economic needs of the people. To accomplish this, an economic plan for the whole region must be considered.

Small isolated projects may fail if they are not integrated into a larger economic plan. For example, the Northern Service Officer at Fort Chimo experienced difficulty in getting the George River Eskimos to cut komatik runners for sale to the Hudson's Bay Company. One of the reasons for this was the fact that the Eskimos had to transport the runners to Fort Chimo. However, had the transportation of these runners been combined with the transportation of other timber from George River, cod and seal meat from Port Burwell, it is quite possible that the project would have been successful.

There is one other important reason why Ungava Bay should be developed as an economic unit. The majority of Eskimo people living here receive Government relief. Owing to the fact that the resources in the Bay are widely dispersed, it is only with a great deal of initiative and hard work that a person is able to remain on the land. The Eskimos, faced with the alternative of living off the land or accepting relief, usually choose relief.

To date most of the projects undertaken have been small, have been of short duration and have employed a limited number of people. Many of the Eskimos see little reason to work when they know that only a few people will be employed and that those who do not work will receive relief allowances. However, if a series of integrated projects could be initiated at the same time, the stimulus to work would be much greater.

It would undoubtedly be expensive to plan and carry through the initial stages of developing a workable economic unit. However, as relief costs in this area vary between $30,000 and $40,000 each year, there is a definite need for sound planning. As much of the work would be done during the summer months, some seasonal supervision would be required. A person with some logging experience would be needed to take charge of the logging operation on the George River, whereas someone with fishing experience would be needed to supervise a fishing project at Port Burwell. Still another person might be required to supervise the distribution of products.

The Northern Service Officer would provide continuity to these projects during the winter.

Ungava Bay does not possess a large quantity of renewable resources, but greater use may be made of those which do exist. It is impossible for any one person or any small group to take advantage of walrus hunting on Akpatok Island, white whale hunting at Payne Bay or Koartak, timber resources of George River, and fishing and seal hunting at Port Burwell. However, if small groups of people can work on projects which will be co-ordinated into a general economic pattern, a greater utilization of existing resources will result and ultimately a higher standard of living will be realized.

PART II

PROPOSALS FOR IMPROVING THE ECONOMY OF THE UNGAVA BAY REGION, WITH SPECIAL REFERENCE TO GEORGE RIVER AND PORT BURWELL

INTRODUCTION

This report does not present an all-inclusive development plan. There are a great many details of organization and planning that have yet to be worked out. However, it is necessary at some point in the planning to set out the general pattern of development.

The preliminary economic survey of the Ungava Bay area indicated the necessity of developing the local Eskimo economy on a regional basis. Relatively large concentrations of natural resources are found throughout the area, yet most of these resources are either neglected, harvested uneconomically or used in a most inefficient manner. Moreover, economic development is severely handicapped by a lack of cash.

The aim of this part of this report is to show ways to:

1) Bring about the optimum utilization of natural resources by the Eskimo people;

2) Develop a form of community life which will improve basic living conditions;

3) Provide a means whereby the Eskimo people will be able to obtain a cash income through the sale of natural resources;

4) Gain information and experience of methods and techniques of economic development which may be applied to other communities in the north.

AN APPROACH TO ECONOMIC DEVELOPMENT

At the present time, few of the renewable natural resources along the east coast of Ungava Bay are being subjected to organized harvesting. As a result, only a few of the Eskimos are able to obtain sufficient human and dog food from the land. In the George River and Burwell areas, the average annual income per family derived through the sale of raw manufactured products obtained from the land is less than $200. However, the results of field study and market research indicate that a planned system of harvesting and marketing these resources could provide the average family with a minimum income of $800 to $1,000 per year and at the same time provide more food and material for local use.

Economic development would require a fairly substantial capital investment for equipment. As the Eskimo people do not have any cash which could be used to finance this development, the money would have to be made available by the Department of Northern Affairs and National Resources, preferably through the Eskimo Loan Fund.

It is important that any industries established be under Eskimo ownership at a very early phase in their development. This is important for two reasons. First, it would not be wise for a Federal Government department to be engaged directly in industries harvesting the natural resources of the Province of Quebec. Secondly, the successful development of these industries would require a good deal of initiative, hard work and determination on the part of the participants. Each project would have a much better chance of success if the Eskimo participants have a financial and emotional stake in its development. Under such a pattern of development, this Department would make money available for the capital investment on a loan basis and provide technical and supervisory assistance until such time as the Eskimo people can manage the industry by themselves. There are two main reasons why this pattern of development can function most effectively under a program of co-operative development:-

1) The general program of development would involve a number of closely integrated industries, each of which would make a contribution to the general economic development. It would be essential that all the people participating in this program understand the general pattern of development as well as the economics of each industry. Perhaps an example will help to illustrate this point. In the George River area, the Arctic char fishery would undoubtedly contribute a major proportion of the total cash income of the community. At the present time the George River people use char extensively for dog food. If the char were exported to southern Canada, a new source of dog food would have to be found. This would be available at Port Burwell in the form of Atlantic cod and seal products. The harvesting and transportation of this food to the George River would in turn support a small industry at Port Burwell. However, the successful operation of each of these projects would require a mutual understanding on the part of all participants. The George River people would have to be taught

the fundamentals of controlled harvesting so that they realized that if they used the Arctic char as a source of cash, they would have to purchase their dog food from Port Burwell. This pattern would work to the mutual advantage of both groups.

(2) The co-operative educational program would stress such things as:-

(a) Village and regional meetings to discuss common problems and seek their solutions.

(b) The development of village and group leaders who would be able to assume the responsibility for the management of the administration of the local industries.

This type of educational program would be extremely beneficial for economic development. It would also help teach the people how to organize and administer their own social and community activities.

This co-operative development should be established under the Quebec Co-operative Syndicates Act. This Act is relatively simple in format and would permit the establishment of a blanket program of development. Specifically, it would permit the establishment of one general co-operative which would include such things as cod and char fisheries, handicraft development, house building, sawmill operation, retail store, etc. This umbrella-type development would also have the advantage of simplifying the educational and supervisory program.

PROPOSED DEVELOPMENT PROGRAM

The development of this program would be centred in two areas, George River and Port Burwell. Each area would have its own central co-operative which would function independently. There would be close co-ordination between the two groups and some exchange of products. Because of the risk and expense involved in establishing new enterprises in the Arctic, some of the industries proposed for this area should go through two stages of development:-

1) An experimental or proving stage which would be financed by this Department.

2) A development stage where the industry would be taken over by the Eskimo people and Government aid limited to the provision of loans and supervisory and technical assistance.

This pattern has already been used in a number of ways in the north. The Arctic char fishery, which was begun at Frobisher Bay in 1958, is a good example. This fishery involved a considerable risk. The market demand, price of transportation and other problems were all unknown factors prior to the establishment of the fishery. A breakdown of any one of these prime factors would have resulted in the failure of the fishery. While the potential of this fishery was good, it was realized that the Eskimo people who knew nothing of the

risks involved should not be asked to invest in an enterprise until it was past the experimental stage. Now that Arctic char have been accepted in southern Canada as a luxury food item, and a large demand has been established, this industry can be turned over to the Eskimo people. The knowledge gained through the Frobisher Bay experiment will be helpful in establishing char fisheries throughout the Arctic.

There would be a number of small industries in the George River-Port Burwell area which, because of the risk involved, should be sponsored by this Department until such time as they prove to be economically feasible.

GEORGE RIVER PROGRAM:

One hundred and two Eskimo people live in this area. Of this population, thirty-five are able-bodied men between the ages of sixteen and sixty. One of these men has year-round employment as the Hudson's Bay camp trader. Two other men have partial employment from April to September with "Arctic Anglers", a sport-fishing camp. The remainder of the men earn from $25 to $300 from trapping during the winter months. This income is supplemented by small wages earned through stevedoring during the summer shipping season. However, perhaps more than in any other Arctic area, the real basis of the economy lies in Government relief and Family Allowance.

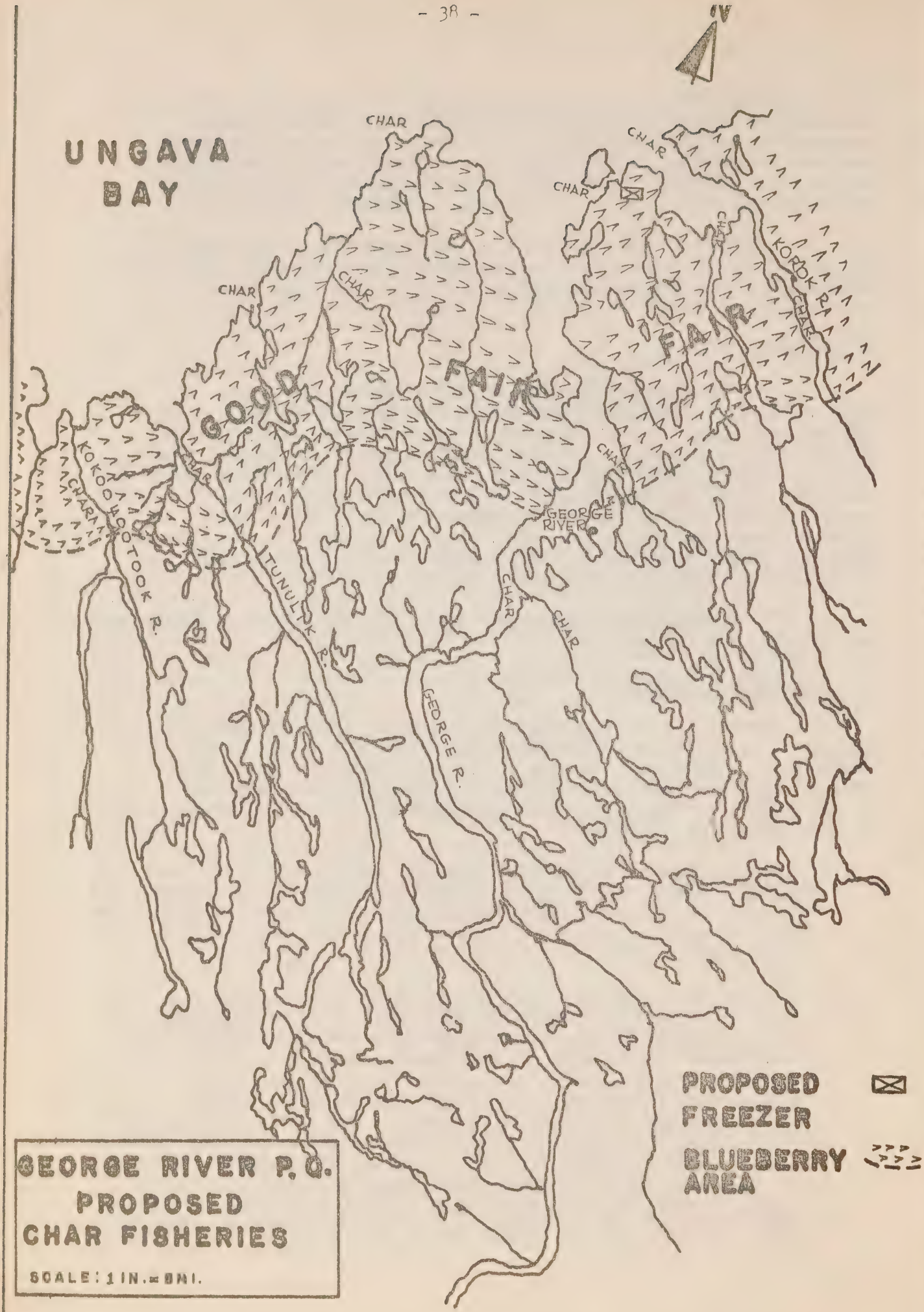
To overcome this undesirable situation, the following industries are proposed for the area:

1) Arctic Char Fishery

Members of the Department of Fisheries, Arctic Research Unit, feel that the extensive system of lakes, streams and rivers in the George River region make this one of the most productive areas in the Arctic. Within a twenty-mile radius of the George River, eighteen rivers empty into Ungava Bay. The suggested pattern for the development of this fishery is as follows:-

(a) The fishery would be based on an annual harvest of 30,000 pounds a year. This is the limit set by the Quebec Department of Game and Fisheries for the 1959 season. If studies indicate that the area can support a larger fishery, the limit could be enlarged.

(b) A combination sharp and storage freezer would be located at the mouth of the George River. The fish from the surrounding area would be picked up each day by a freighter canoe and brought into the freezer where they would be cleaned, frozen and stored. The operation should normally be completed in a six-week period between July 15 and August 31. Under favourable operating conditions, the catch could be secured in four weeks. During the 1959 season, the operation of the fishery would undoubtedly be delayed until early August. The equipment, all of which would be capable of being dismantled into small sections, would be shipped to Port Burwell on the first vessel going into the area. It would then be transported to the George River by Eskimo


UNGAVA BAY
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ITUNULIK R.
GEORGE RIVER
GEORGE R.
KOMAK R.
PROPOSED FREEZER
BLUEBERRY AREA
GEORGE RIVER P.Q.
PROPOSED
CHAR FISHERIES
SCALE: 1 IN. = 8 MI.

Peterhead. Barring unforeseen difficulties, this equipment should be ready for operation between July 20 and August 1.

(c) The marketing of this char would not present a problem. The demand stimulated by the Frobisher Bay fishery last summer will not be met for some time. A. Roy Clouston & Sons Limited, who is handling this fish in the south, does not anticipate any problem in marketing. The fresh frozen fish would have the advantage of being able to be held for a long period of time and can be released on the market gradually over the year. This system of marketing should help ensure a continuous supply of fish and should also help stabilize the price.

(d) The fishery would provide employment for approximately eighteen people on the following basis:-

i) Twelve fishermen, four at George River, four in fishing area west of George River, four in fishing area east of George River.

Note: The fishermen would work in groups of two.

ii) Two fish cleaners (women)

The fish would be cleaned by the fishermen when they are caught. However, a final cleaning operation would be performed just before the fish are frozen.

iii) Two boatmen. These men would operate freighter canoes which would make a daily pick-up and delivery to the freezer.

iv) Two cold-storage workers. The fish would be quick-frozen and dipped in the sharp freezer. Later they would be boxed and stored in the holding room.

(e) The fishery would require a considerable amount of equipment. This would include:

i) Combination sharp-freezer and storage unit, complete with power unit.

ii) Nets, boxes, packaging supplies and miscellaneous equipment.

iii) Two 22' freighter canoes, equipped with 25 h.p. outboards.

iv) Fuel for boats and freezing unit.

The cost of this equipment would be roughly $18,000.

(f) The general economics of this fishery could be worked out on the following basis:-

Income - 30,000 pounds of char @ 80¢ per lb.	$24,000
Costs	
Pay to fishermen - 30,000 lbs. @ 30¢ per lb.	9,000
Handling and packaging - 30,000 lbs. @ 03¢ per lb.	900
Transportation (local and shipping to Montreal) - 30,000 lbs. @ 07¢ per lb.	2,100
Commission to agent - 30,000 lbs. @ 05¢ per lb.	1,500
Interest on loan, plus reduction of principal (Based on repayment of loan in five years)	4,000
Depreciation on equipment	2,000
TOTAL -	$19,500
PROFIT would be distributed through dividends. -	4,500

2) Lumbering Operation:

A timber survey was made of the resources of the George River in 1958.[1] This survey indicated that there is approximately $1\frac{1}{4}$ million feet of black spruce in the area which could be used for commercial exploitation. In addition to this, there is another $3\frac{1}{2}$ million board feet of small dimension timber which would be suitable for Eskimo housing. There are a number of difficulties involved in the development of this industry which have not yet been overcome. However, with these limitations, the possibilities for development are as follows:-

(a) The economics of this operation must be governed by the understanding that there is not enough timber in the area to assure a continuous yield. To make the timber operation profitable, the yearly cut would have to be approximately 300,000 board feet. At this rate, the commercial timber would last for four years.

(b) The timber-felling operation would be conducted during the winter months (November to March). At the time that the logs were cut, they would be transported to the river bank and piled so they could be spilled at the time of the spring high waters. The bulk of the timber is within half a mile of the river, so hauling to the river bank would not present a great problem. The hauling would be done in two ways:-

i) With Eskimo dogteams
ii) With a small tractor

The latter method would undoubtedly be the best, as eighty per cent of the George River dogs died during the winter of 1957-58 from rabies.

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1 See Section 3.

As a result, the dogteams are small.

In June, after the river is free of ice, a timber drive would be conducted. This operation would take approximately three weeks and would move the timber to a catching point approximately five miles south of the proposed mill site. The George River is quite fast and has a considerable number of rapids. However, it should present no difficulty to the driving operation. Milling would be done from July to October and the lumber could be piled over the winter. Cull lumber, edgings and sawdust could provide an important source of fuel for the local people.

(c) The market demand for this timber is good. The main market appears to be at Hopes Advance Bay where the proposed mineral development could quite easily use the entire cut. Representatives of Ungava Iron Ores have shown a definite interest in purchasing this timber. Government construction programs in the Ungava Bay area could also provide a modest market for this timber. The small timber in the area presents interesting possibilities for use in the construction of the Eskimo houses. "Arctic Anglers" provides an excellent example of how this small timber can be used successfully for building construction. In 1958 this camp began operation of a very small sawmill to supply their own needs. The operation used the small timber which grows adjacent to the camp. Rough dimension 2 x 4's, 4 x 4's, 2 x 6's were cut for building construction. Split log siding was also cut in the mill and used to construct warehouses and living accommodation. By using this little mill, "Arctic Anglers" has been able to supply good, cheap housing for its own operation.

Fenimore Mining Company took a small mill into the Larch River during the summer of 1953. This mill was used only one summer and was abandoned when the exploration work in the area was completed.

(d) The number of people employed in the various aspects of this development could be quite flexible. However, the following pattern of operation is suggested:-

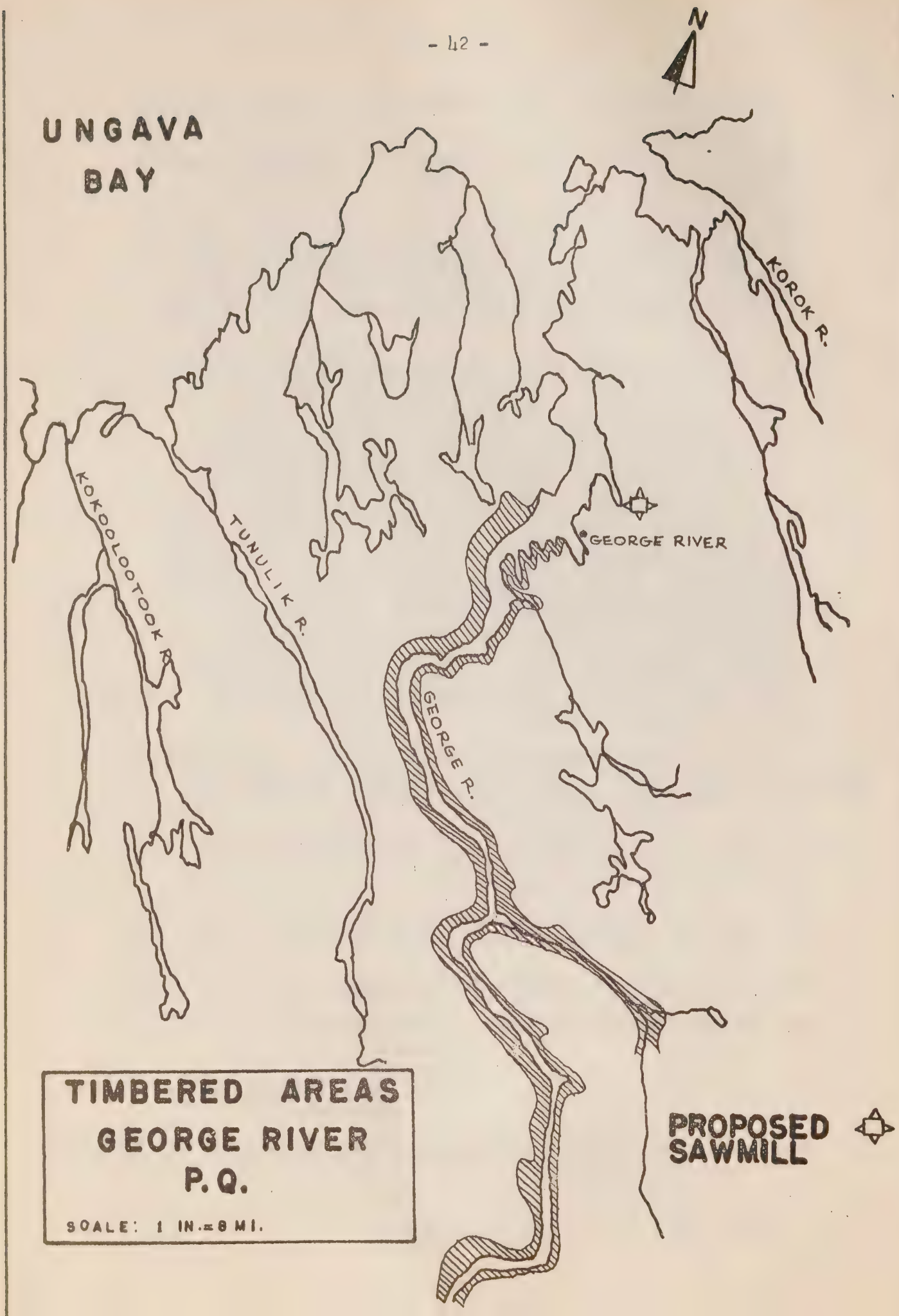
i) Felling, bucking and transporting to river bank - four sets (three men to a set)

ii) Driving operation (ten men for three weeks)

iii) Milling operation (four men - 1 boat operator
1 sawyer
1 helper
1 man for piling and work on green chain.)

The equipment required for this operation would include:-

i) Portable mill
ii) Small river boat
iii) Light tractor with power take-off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KOROK R.
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TUNULIK R.
GEORGE RIVER
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TIMBERED AREAS
GEORGE RIVER
P.Q.
SCALE: 1 IN.=8 MI.
PROPOSED
SAWMILL

iv) Miscellaneous equipment (saws, axes, etc.)

This would involve a capital outlay of approximately $10,000.

(e) Transportation presents the biggest problem to this project. No hydrographic work has been done on the George River and until charts and soundings are available, no shipping company will send its vessels up the river. The Hydrographic Service, Department of Mines and Technical Surveys, has indicated that they may be able to do some hydrographic work of the George River during the summer of 1959. Provided that the surveys are done and a channel established, timber exports could begin in the summer of 1960.
Barging timber from the George River to Hopes Advance Bay presents another possibility. We expect that a number of barges will be available at Hopes Advance Bay as soon as the docking facilities are completed. These could undoubtedly be used to transport lumber during the early part of the shipping season when there is not much danger of storms. However, such a pattern would involve a considerable risk and should be considered only if it is impossible to transport the lumber by ship.

(f) The economics of this operation on a yearly basis could be estimated as follows: -

Income - 300,000 board feet @ $125 per 1,000	$37,500
Costs	
Felling, bucking and transportation to river bank, 300,000 board feet @ $20 per 1,000	6,000
River driving	1,500
Milling	5,000
Transportation at $50 per 1,000	15,000
Repayment of loan, plus interest (Based on four years of operation)	3,000
Depreciation	1,000
Stumpage at $4.00 per 1,000	1,200
TOTAL -	$32,700
PROFIT would be distributed to participants in form of yearly dividends.	4,800

(g) What has been classified as "commercial operation" includes only the processing of timber which could supply dimension lumber. It does not include the smaller timber which could be used for Eskimo housing. Members of the Building Research Unit, National Research Council, feel that this type of timber could be used to construct cheap, comfortable and well-designed houses. They suggest that this type of house could be made up in pre-cut units at the mill site

and transported to the construction site. At the present time, few of the Eskimos in Ungava Bay could afford to buy such units. However, if the Hopes Advance mining development goes ahead, it will likely employ a large number of Eskimos. These people will be wage earners and will be in a position to buy their own homes.

(h) There are a great many "ifs" and "buts" involved in the development of this industry. Transportation is the greatest difficulty. If this problem can be overcome, a most successful operation could be started. As the situation now stands, a ship passage in the George River could not be established until late in the summer of 1959 and timber export could not begin before 1960. Until an adequate transportation system is established, it would not be wise for the Eskimo people to invest in a commercial lumbering operation. However, if the Fenimore mill could be purchased and transported to the George River for less than $1,000, a local lumbering industry should be started immediately. There is a desperate need for approximately twenty-five housing units in the George River-Port Burwell area and this mill could be used economically for this purpose.

3) Handicraft Industry

At the present time, very little handicraft work is done by the George River people. This is a result of two factors:-

a) The people are not aware of the demand for their handicrafts.

b) Many of the articles that are manufactured require materials which must be purchased at the Hudson's Bay store. Very few of the people have enough spare cash to purchase materials for handicraft production.

The market research that has been done in southern Canada indicates that there is a great demand for the type of handicraft that can be produced in this area.
The following pattern of development is suggested:-

1) The George River men make good models of kayaks, harpoons, fish spears, etc. They also make excellent full-sized kayaks. The women are good seamstresses and are capable of turning out quality parkas, sealskin slippers, duffel mitts and socks. A handicraft co-operative should be established to produce articles familiar to the area.

2) By the spring of 1959 the Development Section will have made a thorough assessment of the market demand for most of the Eskimo handicrafts, and should be in a position to direct orders for specific types of handicrafts to various production areas. Acting as co-ordinator between buyer and producer, the Development Section could see that specific orders are placed with the George River handicraft co-operative.

3) Fifteen hundred dollars should be made available under the general development loan for the purchase of handicraft materials. For the first year of operation, at least, this co-operative would be operated as a cottage industry and all work would be done in the individual homes. The handicraft industry would serve to furnish supplementary income during slack periods.

4) Blueberry Picking

There is a large demand for fresh frozen blueberries. The Indian people of northern Saskatchewan and Manitoba supplement their income during the summer months by blueberry picking. In the Maritime provinces, most of the commercial fish freezing plants buy blueberries from the local residents and store them in their freezing facilities. A small industry should be established in the George River region:-

(a) Wild blueberries are very plentiful in the area west of the George River (see map) and are common along the George River. While no estimate of production has been made, in all probability this resource could provide a most worthwhile income for women and children.

(b) Twelve fishermen and their families would be dispersed along the coast in connection with the char fishing. The blueberry picking could be done during the latter part of the fishing season and after the fishing season has closed.

(c) This operation would require very little equipment. Rakes and gathering baskets would be all that would be required for the first year of operation. The industry would use the freight transport and freezing facilities of the char fishery. If the industry proved to be successful, a small shaker-table could be purchased to aid in the cleaning operation at the freezer.

(d) As an assessment of the crop potential has not been made, it is impossible to estimate the economics of the industry. However, a general evaluation could be worked out on the following basis:-

Value of berries - 25¢ per lb.

Note: This is the price paid at the freezer during the 1958 season.

Costs

a) Price paid to pickers	15¢ per lb.
b) Packaging, sorting, cleaning	3¢ per lb.
c) Freezer storage costs	2¢ per lb.
d) Transportation - local	2¢ per lb.
TOTAL -	22¢ per lb.
PROFIT to co-op	3¢ per lb.

(e) This operation would involve very little financial risk. It would need only a very small outlay for equipment and would use facilities that would already be established.

5) Government-Sponsored Experimental Projects

a) House-Building

The National Research Council has offered to help develop plans for Eskimo housing which will utilize the local timber. We recommend, therefore, that $2,000 be spent for materials to build proto type houses designed to meet the needs of:-

1) People who would be involved in the economic development of the George River and Port Burwell areas.

2) People who would be employed permanently in wage employment at Hopes Advance Bay.

This type of experiment would help to meet the need for local housing. If a suitable design could be developed, it would provide efficient housing for the people at Hopes Advance Bay, and the work involved in gathering the timber would help finance a lumbering operation at the George River.

b) Agricultural Development

During the summer of 1958 a member of the agricultural unit at Fort Chimo was able to make a brief study of the agricultural possibilities at the George River. The result of this study indicated that there were excellent possibilities for establishing small garden plots in the area. While gardening would probably never become a major industry in the area, it could provide a much needed source of fresh vegetables. We hope that if a permanent community is established at the George River, the people will be able to maintain small garden plots. We recommend, therefore, that under the guidance of the Department of Agriculture a small gardening project be undertaken.

Supervisory Personnel

Very close supervision will have to be provided for each project during the initial stages of development. This is necessary for two reasons:-

1) Each industry would involve technical skills and understandings that are new to the Eskimo people. These new skills must be carefully taught to the people involved if the projects are to be successful. A slip-shod introduction to the methods and techniques of operation of any of these industries would make it almost impossible for the Eskimo people ever to take over management of these operations. The importance of adequate supervision, therefore, cannot be over-stressed.

2) The projectswould be developed on a co-operative basis. This would require an educational program designed to acquaint

the people with the theory of co-operation and self-help. The educational program would also provide training in the administration of the enterprises and would help to prepare the Eskimos to assume the responsibilities of management. There is no short cut for this educational program, and if it is not done properly, the projects will fail. The following supervisory personnel would be required for the George River development:-

(a) Char Fishery and Blueberry Picking -

One man with a general knowledge of refrigeration and fish-handling techniques, also capable of supervising blueberry industry - June 15 to September 15.

(b) Lumbering -

One man skilled in sawmill operation and capable of supervising cutting and driving operation - April to October.

(c) Experimental Housing)
Experimental Agriculture) One man to organize and supervise
Handicraft Industry) development of these projects.

In addition to this personnel, it would be necessary for the co-operative development officer to spend some time in the area organizing the co-operative educational program.

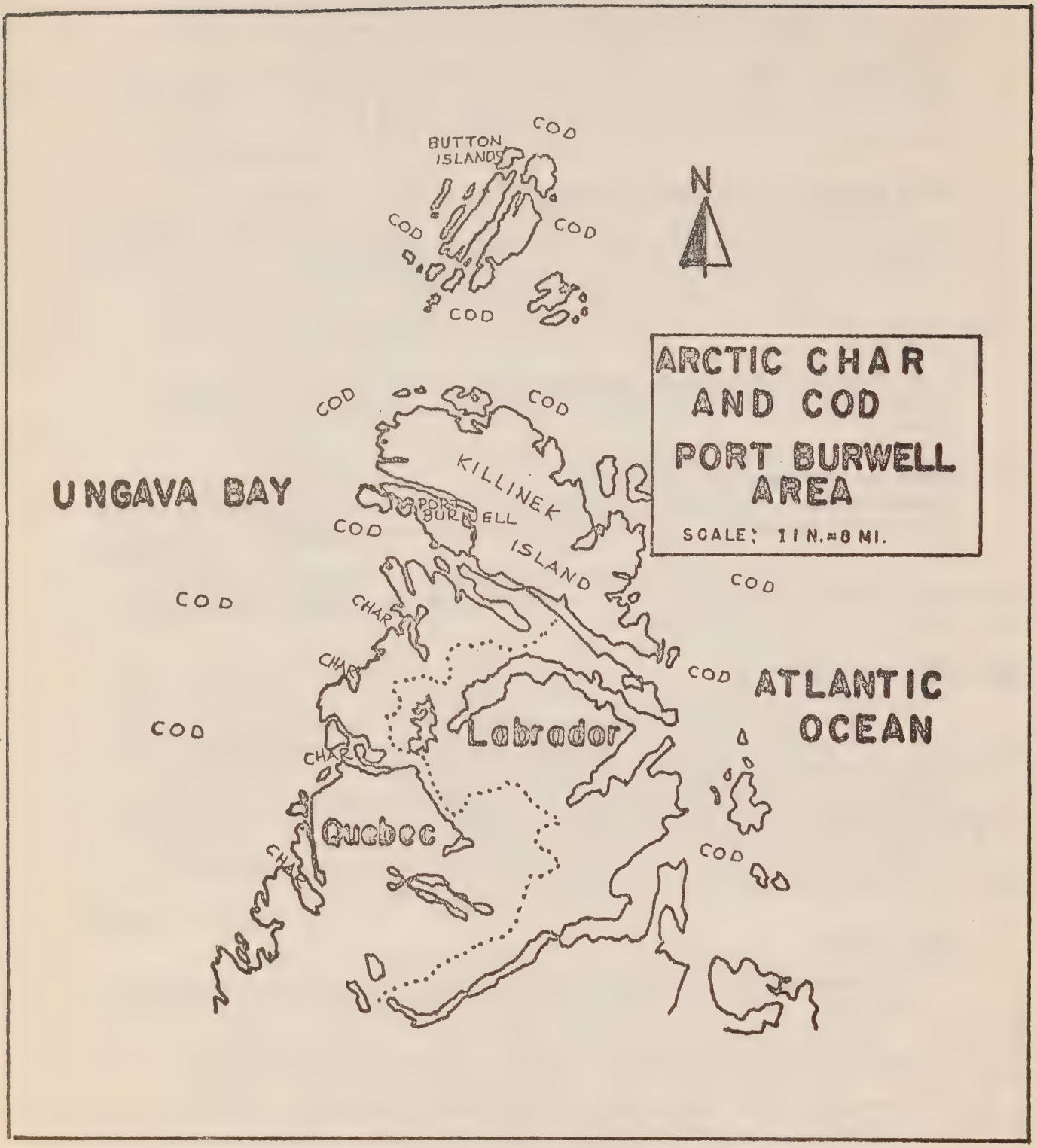
PORT BURWELL PROGRAM:

At the present time the Eskimo population at Port Burwell numbers twenty-four persons, and only six of these are able-bodied men capable of participating in the industries that could be developed in this region. However, the possibilities for economic development are excellent, and people now living at Whale River, Fort Chimo and along the coast of Labrador would welcome the opportunity of moving to Port Burwell, at least for the summer months to participate in the industries that could be developed there. The following pattern of development is recommended.

1) Char Fishery

The possibilities for the development of the char fishery in this area are excellent. A few char are taken by the Port Burwell people at the present time for their own use, but this catch represents only a very small percentage of the potential harvest. For the first year of operation, the industry would be based on a 30,000-pound catch. This is the limit set for 1959 by the Quebec Department of Game and Fisheries for the Quebec coastal area adjacent to Port Burwell.

Port Burwell is very accessible from a transportation point of view because it lies very close to the main shipping routes to the Arctic. An effort, therefore, would be made to complete the char fishery as soon as possible so that the fish can be shipped to southern Canada and the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PORT BURWELL AREA
SCALE: 1 IN. = 8 MI.
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KILLINEK ISLAND
PORT BURWELL
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CHAR
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COD
Labrador
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Quebec
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COD

freezer made available for other purposes. The fishery would follow the same pattern of development as outlined for the George River area.

2) Handicraft Industry

Very little commercial handicraft production is done by the Port Burwell people at the present time. As in the case at the George River, this is caused by the fact that the people are not aware of the demand for handicrafts and they lack the money to purchase the manufactured materials necessary for the production of some of the handicrafts.

The handicraft industry at Port Burwell would be concerned mainly with articles which would be produced by the women. Hunting in the area is good, and the men would be involved in this pursuit during most of the winter.

The Port Burwell women are known throughout the Arctic for their skill in manufacturing sealskin boots and sealskin slippers. There is an excess of sealskins available in the area so that no outside materials would be required for the manufacture of these products. The women are also capable of manufacturing excellent parkas, duffel socks, mitts, etc. It is, therefore, recommended that specific orders for crafts be placed with the Port Burwell handicraft co-operative during the summer of 1959.

3) Government-Sponsored Experimental Projects

a) Cod Fishery

The Atlantic cod come into the Port Burwell area around the middle of July. They remain there until the latter part of October. The fish are plentiful around Killinek Island and along the Labrador coast close to Port Burwell. They are also found along the Quebec coast for a distance of approximately twenty miles from Port Burwell.

The Department of Fisheries did a considerable amount of research work in the Port Burwell area. However, they were not able to make an estimate of the cod population. Members of the Arctic Research Unit have suggested that if an experimental fishery program was conducted during the summer of 1959, it could serve as a basis for estimating the potential catch for the area. The following pattern of experimental work is suggested:-

(a) A grid pattern for fishing would be set and specific areas fished at various times during the summer. Accurate records of: a) areas fished, b) number of fish caught, c) water temperatures, d) fish size and weight, would be kept and on the basis of this information the Arctic Research Unit would be able to estimate the size of the potential fishery. A minimum catch of 300,000 pounds of fish would be required to establish an economic cod fishery.

(b) The fish caught during the project would be experimentally:

i) Dried
ii) Salted
iii) Smoked
iv) Frozen

Thirty thousand pounds would be used for an experimental shipment to Montreal and the remainder would be used for local consumption.

(c) If the experiment indicated that the fish population was large enough to establish a 100,000 pound plus cod fishery, the economics of the enterprise could be worked out on following basis:-

Cod prices are subject to fluctuation. The price of 20¢ a lb. is meant to strike an average. The present wholesale price for cod is 24¢ a lb. and the demand is expected to remain high.

100,000 lbs. of cod fillets at 20¢ per lb. - $20,000

Costs:

a)	Price to fishermen, 100,000 lbs. @ 2¢ a lb.	2,000
b)	Handling and packaging, 100,000 lbs. @ 3¢ a lb.	3,000
c)	Transportation (including local and shipping to Montreal) - 100,000 lbs. @ 5¢ a lb.	5,000
d)	Interest on loan, plus reduction of principal (Based on capital investment of $30,000 to be paid in ten years)	3,500
e)	Depreciation on equipment	3,000
	TOTAL -	$16,500
	Profit	3,500

If this industry was established, it would not bring a large return to the participants. However, it would involve a number of fishermen in the processing and handling of the fish and also provide employment for women. It could, therefore, provide constructive employment for people who would otherwise be living on Government relief.

b) Greenland Shark Fishery:

Fishery research teams at Port Burwell have reported that Greenland shark are quite common in the area. The livers can be used as a source of butyl alcohol. The skins are used extensively in the leather industry and the meat, if properly dried and cured, can provide an excellent source of dog food. Two firms have made enquiries to this Department regarding the possibility of obtaining shark livers from an Eskimo fishery. The number of sharks that could be obtained in the area is not known, so it is proposed that an experimental shark fishery be undertaken in conjunction with the cod fishery. If it proves

successful, it could be established as an Eskimo-owned industry on a permanent basis.

c) Sealskin Tanning and Seal Meat Processing:

Port Burwell lies close to the main migration route of the harp seal. These animals migrate northward during April, May and June and return south during October, November and December. Fisheries experts have estimated that an additional 3,000 harp seal could be taken each year at Port Burwell without damaging the herd. Such a harvest would provide a large amount of meat, oil and skins.

The oil could be used very effectively in the area. The people live in tents or shacks that require heating. At present the only source of fuel utilized by the people is driftwood, and this is often very difficult to obtain. Several types of stoves have recently been developed in southern Canada which are capable of burning seal oil. The oil then could be used as a source of fuel. Also, experiments should be conducted with:-

1) Heat-drying machines to acquaint the people with the processes of heat-drying and packaging. An evaluation would also be made of the acceptability of the processed meat by the people in the area. If the experiment was successful, an industry would be established and the meat sold or traded to -

   i) George River people for human and dog food;
   ii) Eskimo people at Hopes Advance Bay engaged in wage employment and who are unable to hunt;
   iii) Government administration who could use it as a wholesome addition to Eskimo relief rations which are very low in protein.

2) Tanned sealskins could be used effectively in handicraft production. A number of tanning processes have been developed which could be undertaken with a minimum of equipment. A test of these processes should be carried out and an evaluation made of the results.

Supervisory Personnel

Close supervision will be required for the projects to be undertaken at Port Burwell. The following personnel will be required:-

(a) Char Fishery -

One man with a general knowledge of refrigeration and fish-handling techniques- June 15 to September 15.
One assistant - June 15 to July 10.

(b) Cod Fishing Experiment
Greenland Shark Fishing Experiment
Sealskin Tanning and Seal Meat Processing Experiment
Handicraft Production

- One man skilled in cod fishing and processing techniques, capable of supervising other experiments - July 10 to September 15 -

COMMUNICATIONS

Good communications will play an exceedingly important part in the successful operation of these industries. Radio communication between Fort Chimo, Port Burwell and George River will be useful for such purposes as:-

1) Notifying each area of the time of ship arrivals.
2) Ordering parts when mechanical breakdowns occur.
3) Requesting additional labour for specific projects.
4) General communication
5) Medical advice.

It is, therefore, recommended that field transmitting and receiving sets be established at Fort Chimo, George River and Port Burwell.

Community Development:

The successful establishment of a planned economy at George River and Port Burwell will make it possible for the people to develop their communities. Projects to provide such things as fuel, water and possibly light will undoubtedly develop as the result of the increased cash income. The experience the people will have in the purchasing of equipment and supplies for the various projects will show them the advantages of having their own co-operative retail outlet. The results, therefore, of establishing a few well-planned industries will be to provide a sound economic basis for each community which in turn will make it possible for the people to gain a much greater amount of independence and control over their own lives which is not possible under the existing economy.

Role of Northern Service Officer:

It is essential that the Northern Service Officer play the major role in the overall development of these projects. This is important for two reasons:-

1) As a co-ordinator of Eskimo activities he is in a position to evaluate the social and economic requirements of the people. Undoubtedly, some of the people will benefit from the opportunities of wage employment; others will achieve more success working in the small local industries. The Northern Service Officer will play an important part in helping the people understand the ramifications of each way of life.

2) The Northern Service Officer will be resident in the area throughout the year and will be able to provide continuous supervision to the project.

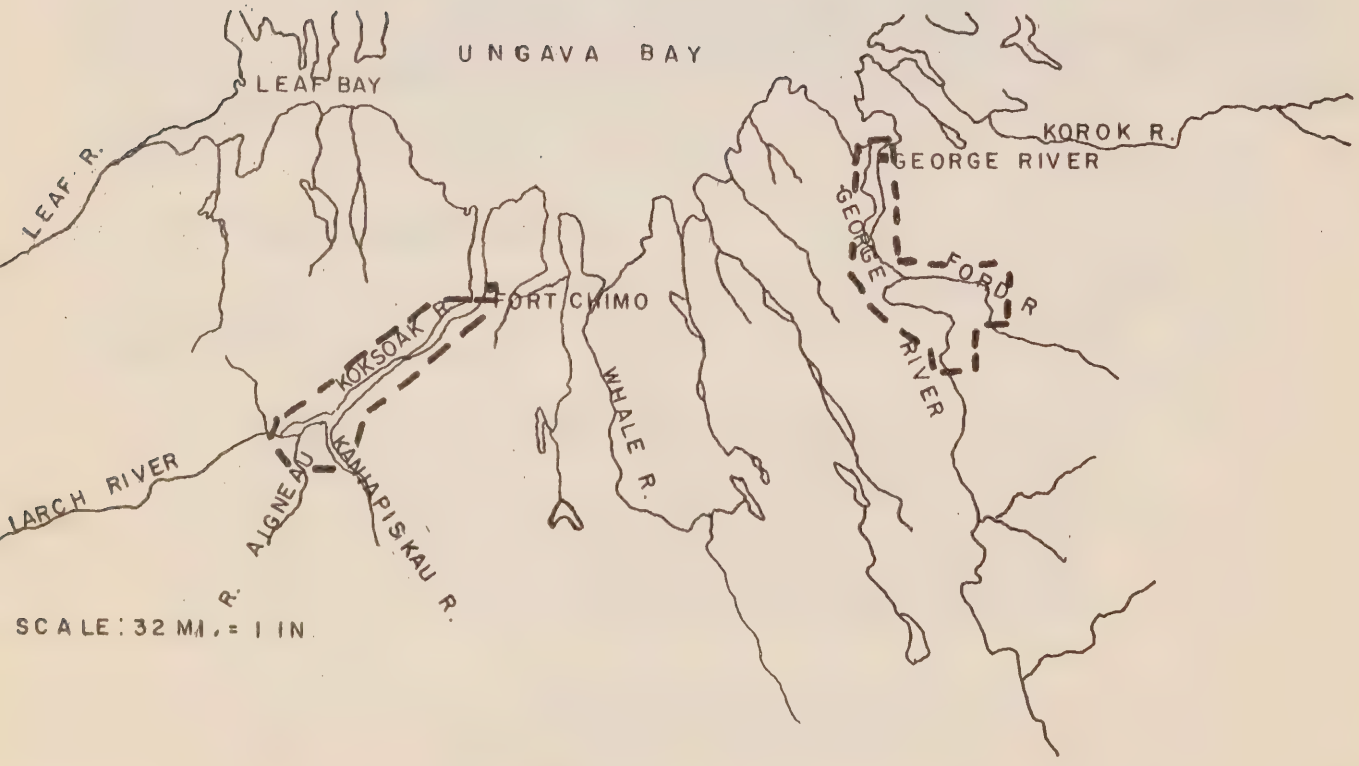
PART III

A TIMBER RECONNAISSANCE OF THE GEORGE AND KOKSOAK RIVERS

INTRODUCTION

During the summer of 1958, a reconnaissance was made of the timber resources of the George and Koksoak Rivers. This reconnaissance was part of the general economic survey of the eastern coast of Ungava Bay designed to assess the natural resources of the area which could be developed as Eskimo industries. The reconnaissance was not designed to make a complete assessment of the timber resources of this area, but was aimed at assessing the accessible timber which could possibly be utilized by a commercial operation.

MAP SHOWING TIMBERED AREA
COVERED BY
RECONNAISSANCE SURVEY



THE AREA STUDIED

THE KOKSOAK RIVER

(Including the lower reaches of the Larch and Kaniapiskau Rivers)

Throughout most of its length, the Koksoak runs through a broad, smooth channel broken only twice by series of rapids. The river valley varies in width from one to six miles. In the lower reaches of the river, bare hills slope down to the water's edge. Approximately thirty-five miles south of the river mouth, the valley widens and the vegetation becomes heavier. Large thickets of Alder and willow line the river banks, and extend inland several hundred yards. Bogs and marshes are common on the flat areas adjacent to the river.

The whole region has been heavily glaciated, and evidence of scouring and deposition are widely distributed. In some sections thick layers of drift completely mask the bedrock. These unconsolidated deposits consist of gravel, sand and clay. Boulders are scattered over much of the upland surface and along the river course where they present a serious hazard to navigation. Numerous sandy terraces are found along the river banks. On the Larch and Kaniapiskau these terraces rise to 250 feet in height. Approximately six miles above its junction with the Larch and Koksoak, the Kaniapiskau narrows and runs along a deep gorge for several miles.

THE GEORGE RIVER

(Including lower reaches of Ford River)

From Indian House Lake to the sea, a distance of approximately 120 miles, the George River drops 1,000 feet. As a result of this steep incline, the river is a succession of rapids and swift water. Throughout most of its course the river runs through a narrow valley that ranges in width from one to four miles. The shores of the river are composed largely of clay beds which underlie heavy deposits of sand and gravel. Rocky ridges 200 to 800 feet in height rise abruptly from the narrow flats which border the river.

TIMBER

KOKSOAK

On the Koksoak and tributaries and the lower reaches of the Larch and Kaniapiskau Rivers the following tree species were found: black spruce, larch, balsam fir and white spruce. Of these four species, black spruce and larch were dominant and only a very few occurrences of white spruce and balsam fir were found.

Larch:

This species dominates the forest nearest the river mouth and on the terraces along the lower sections of the river. The heavier stands of larch are in moist, wet habitats surrounding bogs and marshes. In some of the very wet environments, up to thirty per cent of the larch had heart or butt rot.

The largest larch included in a plot on the Koksoak reconnaissance was 71 feet in height, had a d.b.h. of 22 inches and was 174 years old. South of the junction of the Larch, Koksoak and Kaniapiskau Rivers only occasional larch were seen.

Black Spruce:

There were very few black spruce close to the mouth of the river. South of Fort Chimo black spruce gradually became more common and approximately thirty miles south of the settlement, black spruce dominated the pulpwood-sized forest in the river valley.

The largest black spruce included in a plot was 49 feet in height, had a d.b.h. of 14 inches and was 176 years old.

White Spruce:

A few scattered white spruce were found growing on the alluvial deposits along the river banks south of the junction of the Larch, Koksoak and Kaniapiskau.

Balsam Fir:

Only a few scattered examples of this species were found close to the junction of the Larch, Koksoak and Kaniapiskau.

GEORGE RIVER

The forest growth in this area is confined to narrow strips $\frac{1}{4}$ to 2 miles wide which parallel the river. The following tree species were recorded in plots on the George and Ford Rivers: black spruce, larch, balsam fir and white spruce. Two very small stands of white birch were seen approximately sixty miles south of the river mouth. Heavy thickets of Alder and willow line the banks of the river over most of its course.

A distinct pattern of tree growth was noted over much of the area covered by the reconnaissance. On the river bank a relatively large well-developed tree growth was found immediately adjacent to the river. Farther inland this strip was replaced by a strip of bog and marsh covered with spruce and larch. On the hillsides sloping toward the river was the heaviest growth of timber. These stands became stunted on the upper section of hills.

Black spruce:

Of the 46 plots measured during the George River reconnaissance, black spruce comprised the dominant species in all but one of the plots. On the lower sections of the river, the trees were relatively small with an average d.b.h. of 6 inches and a length of 30 feet. However, in some of the heavier stands 70 to 90 miles south of the river mouth, the black spruce ranged up to 72 feet in height with a d.b.h. of 32 inches. In these heavy stands, heart rot affected up to fifteen per cent of the timber.

Larch:

Larch are relatively common on the lower reaches of the river. Farther inland they are less prevalent and are found mainly in the wet, marshy areas. The largest larch recorded during the reconnaissance was 59 feet in height and had a d.b.h. of 14 inches.

White Spruce:

A few scattered stands of this species were found. They comprised a relatively small portion of the timber volume in this area.

Balsam Fir:

Individual trees were recorded in three plots. However, they were extremely rare on the section of the river covered by the reconnaissance.

VOLUME AND UTILIZATION

The evaluation of the timber resources of the George and Koksoak River systems was made on the basis of field work and an interpretation of air photo coverage. The air photos were of limited value in the estimation of timber volume. While some low-level air photos were available, the majority of photos were taken from 10,000 to 20,000 feet and, as a result, they were useful in establishing timber boundaries, but they were of little value for density interpretation.

Koksoak -

The reconnaissance on the Koksoak system covered the following areas:-

Koksoak	-	60 miles south of Fort Chimo post
Larch	-	16 miles west of junction with Koksoak
Kaniapiskau	-	12 miles south of junction with Koksoak

The following table gives an indication of timbered area (acres), volume per acre, total volume, commercial volume, and highest density volume along the Koksoak system:

TABLE NO. III

Timber Volume

Timbered Area (Acres)	Average Volume Bd/ft. per acre	Total Volume Bd/ft.	Commercial Volume Bd/ft.	Highest Density Volume Bd/ft. per acre
38,541	137	5,289,336	793,400	2,782

As can be seen from Table No. III, the average volume per acre for the "forested" area is very low. Indeed, a good deal of the forested area has a timbered density of less than 100 board feet to the acre.

The figure for commercial volume has been derived after consideration of two main factors:-

(a) Timber stands containing volume greater than 800 board feet to the acre;

(b) Stands within one mile of the river bank.

TABLE NO. IV

Species Distribution -

Black Spruce	Larch	White Spruce	Balsam Fir
68%	31%	.5%	.5%

This table indicates the relative volume by species over the whole area. The field study indicated that larch is the predominant species in the area immediately adjacent to the Fort Chimo post. Further south, black spruce becomes more common, and in the area south of the junction of the Larch, Koksoak and Kaniapiskau, it completely dominates the forest. White spruce and balsam fir were found only in the region south of this junction.

TABLE NO. V

Size Volume Distribution of "Commercial" Timber -

D.B.H.	4"	6"	8"	10"	12"	14"	16"	
Black Spruce	19%	27%	23%	22%	4%	2%	3%	
Larch	32%	29%	20%	12%	5%	2%		

As indicated by this table, the bulk of the timber is concentrated in the tree size ranging from 4" to 10" d.b.h. The concentration of volume in such small tree sizes will limit any commercial exploitation.

Utilization

At the present time, very little use is made of the timber resources of the Koksoak River. Roughly, 4,500 trees are cut each year for firewood, and from time to time some of the larger timber is used to manufacture komatic runners. This, however, constitutes the total yearly cut.

Undoubtedly, greater local utilization could be made of this timber. The standard of Eskimo housing at Fort Chimo and at Fort Chimo air base is very low. Many of the people are living in shacks constructed

from scrap lumber. In many cases this building material proved to be inadequate and a most inferior type of dwelling resulted.

The timber on the Koksoak system could provide an excellent building material for a log or split-log type of house construction.

It is doubtful if this timber could ever be milled and marketed in the area as dimension lumber, as the high cost of handling would make such a venture impractical.

George -

The reconnaissance on the George River system covered the following areas:-

George River - from river mouth 96 miles south
Ford - from junction with George 14 miles west

The following table gives an indication of timbered area (acres), the average volume per acre, total volume, commercial volume, and highest density volume along the George system:-

TABLE NO. VI

Timber Volume

Timbered Area (Acres)	Average Volume Per Acre Board Ft.	Total Volume Board Ft.	Commercial Volume Board Ft.	Highest Density Volume Board Ft/Acre
32,345	153	4,948,785	1,237,196	11,829

As was the case on the Koksoak, the average volume per acre in this area is low, and much of the forested area has a timber density of less than 100 board feet to the acre. However, a significant difference between the timber found on the George and that found along the Koksoak system, is that on the George, relatively large pockets of heavy density timber are quite common.

TABLE NO. VII

Species Distribution -

Black Spruce	Larch	White Spruce	Balsam Fir
90%	8%	1%	1%

Black spruce dominated all the forested areas covered by the reconnaissance. However, this dominance became more pronounced along the more southern reaches of the river. No balsam fir or white spruce were found south of the junction of the George and Ford Rivers.

GENERAL TIMBER GROWTH PATTERN
GEORGE RIVER, P.Q.

HIGH HILLS

MERCHANTABLE TIMBER

SCRUB TIMBER AND MARSH

SCRUB TIMBER

TABLE NO. VIII

Size Volume Distribution of "Commercial" Timber -

D.B.H.	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"
Black Spruce	7%	6%	13%	15%	12%	10%	8%	4%	4%	3%	6%	7%	2%	2%	1%
Larch	27%	34%	24%	12%	3%										

The size volume distribution of the black spruce is spread relatively evenly over the d.b.h. range 4" - 30". The quantity of relatively large timber, therefore, makes the George River stand of some economic importance.

Utilization

A very limited amount of the George River timber is being used at the present time. Approximately 1,500 trees are cut for firewood each year in the vicinity of the Hudson Bay outpost, and periodically the Eskimos travel up-river to the heavy stands of timber to cut komatik runners.

Further utilization is made by Arctic Anglers, a small fishing camp which is located approximately 50 miles above the George River outpost. In 1958, this camp began operation of a very small sawmill to supply their own building requirements. The mill, which is capable of cutting logs up to 10 inches in diameter, utilizes some of the small timber growing adjacent to the camp. Rough dimension 1 x 4's, 2 x 4's, 4 x 4's, 2 x 6's were cut for building construction. Split log siding was also cut in the mill and used to construct a warehouse and living accommodation. While the operation in itself is exceedingly small, it does point out that the timber of this area can be used successfully for northern construction.

The slow growth rate of the timber in the George River stands excludes the possibility that this area could supply even a very small commercial operation with enough timber to operate on a continuing yield basis. However, taking into account the high cost of importing timber from southern Canada, it is quite feasible that a small mill could conduct an economic operation for a limited period of time.

Though it contains a number of rapids, the George River provides an excellent waterway for the transportation of logs to a milling site close to tidal water.

Possibilities for timber utilization include:-

a) Dimension lumber
b) Railroad ties
c) Log and split log housing

PLOTS

The selection of plot areas was hindered by a lack of adequate air photo coverage. However, on the basis of the photos that were available, a representative sample (23 plots on the Koksoak and 46 plots on the George) was taken. The plots covered an area of one acre each and were run in strips 66 feet by 660 feet. Representative tree samples were taken in all of the plots. (See appendix). For plot location, see Appendices A and B.

KOKSOAK - Plot #1

Topography: Flat and poorly drained. Very heavy moss cover extended over the entire plot.

Species: Larch Volume: 136 board feet to the acre.

Plot #2

Topography: River flat, heavy moss cover

Species: Larch Volume: 256 board feet to the acre.

Plot #3

Topography: Well-drained river slope. Heavy willow underbrush

Species: Black Spruce Volume: 289 board feet to the acre.

Larch 249 " " " " "

Total - 538 board feet to the acre.

Plot #4

Topography: Generally flat with slight slope towards river. Heavy moss cover with small amount of underbrush

Species: Larch Volume: 456 board feet to the acre.

Black spruce 1,034 " " " " "

Total 1,490 board feet to the acre.

Plot #5

Topography: Generally flat with a considerable amount of swamp. Heavy moss cover in elevated areas.

Species: Larch Volume: 508 board feet to the acre.

Black spruce 277 " " " " "

Total - 785 board feet to the acre.

Plot #6

Topography: Generally flat with a slight slope towards the river.

Species: Larch Volume: 204 board feet to the acre.

Black spruce 981 " " " " "

Total -1,185 board feet to the acre.

Plot #7

Topography: Flat, well-drained creek bank. Heavy moss cover.

Species: Larch Volume: 961 board feet to the acre.

Black spruce 1,821 " " " " "

Total 2,782 board feet to the acre.

Plot #8

Topography: Flat sandy terrace, well-drained. Heavy moss cover.

Species: Larch Volume: 102 board feet to the acre.

Black spruce 1,749 " " " " "

Total 1,851 board feet to the acre.

Plot #9

Topography: Flat plateau approximately 200 feet above the river. Area is flat and well-drained.

Species: Larch Volume: 24 board feet to the acre.

Black spruce 1,205 " " " " "

Total 1,229 board feet to the acre.

Plot #10

Topography: Area flat and well drained. Light moss cover. Lower section of the plot affected by spring floods.

Species: Larch Volume: 78 board feet to the acre.

Black spruce 1,962 " " " " "

White spruce 143 " " " " "

Total 2,183 board feet to the acre.

Plot #11

Topography: Gentle slope towards river. Area well drained. Heavy moss cover.

Species:		Volume:
	Larch	366 board feet to the acre.
	Black spruce	1,509 " " " " "
	Total	1,875 board feet to the acre.

Plot #12

Topography: Stand located on flat plateau approximately 50 feet above river. Area well drained. Heavy moss cover.

Species:		Volume:
	Larch	162 board feet to the acre.
	Black spruce	715 " " " " "
	Total	877 board feet to the acre.

Note: Strips of wind-blown timber found in the area.

Plot #13

Topography: Well-drained river flat. Heavy moss cover.

Species:		Volume:
	Black spruce	1859 board feet to the acre.
	White spruce	49 " " " " "
	Balsam fir	163 " " " " "
	Total	2071 board feet to the acre.

Plot #14

Topography: Flat well-drained plateau approximately 250 feet above the river. Heavy moss and bush cover.

Species:		Volume:
	Black spruce	1741 board feet to the acre.

Plot #15

Topography: Large plateau approximately 350 feet above the river.

Species:		Volume:
	Black spruce	1131 board feet to the acre.

Plot #16

Topography: Large flat two miles inland from river. Open park land. Very heavy moss cover.

Species: Black spruce Volume: 963 board feet to the acre.

Plot #17

Topography: Flat well-drained area approximately 200 feet above the river. Heavy moss cover.

Species: Black spruce Volume: 1410 board feet to the acre.

Plot #18

Topography: Gentle slope towards the river. Area well drained. Light moss and bush cover.

Species:		Volume:
	Larch	12 board feet to the acre.
	Black spruce	1517 " " " " "
	White spruce	76 " " " " "
	Balsam fir	137 " " " " "
	Total	1742 board feet to the acre.

Plot #19

Topography: Gentle slope towards the river. Area well drained. Light moss and bush cover.

Species:		Volume:
	Larch	510 board feet to the acre.
	Black spruce	441 " " " " "
	Total	951 board feet to the acre.

Plot #20

Topography: Fairly well-drained river flat. Light moss and bush cover.

Species:		Volume:
	Larch	1004 board feet to the acre.
	Black spruce	483 " " " " "
	Total	1487 board feet to the acre.

Plot #21

Topography: Gentle slope towards river. Area well drained. Light moss cover.

Species:		Volume:	
	Larch		489 board feet to the acre.
	Black spruce		468 " " " " "
		Total	957 board feet to the acre.

Plot #22

Topography: Gentle slope towards river. Area well drained. Light moss cover.

Species:		Volume:	
	Larch		822 board feet to the acre.
	Black spruce		300 " " " " "
		Total	1122 board feet to the acre.

Note: A good deal of woodcutting has been done in this location.

Plot #23

Topography: Flat sand and gravel terrace. Good drainage.

Species:		Volume:	
	Larch		859 board feet to the acre.
	Black spruce		902 " " " " "
		Total	1761 board feet to the acre.

Note: Good deal of woodcutting done in the area.

. . . .

GEORGE RIVER -

Plot #1

Topography: Fairly well-drained river flat. Heavy moss and bush cover.

Species:		Volume:	
	Larch		374 board feet to the acre.
	Black spruce		852 " " " " "
	Balsam fir		63 " " " " "
		Total	1289 board feet to the acre.

Plot #2

Topography: Flat well-drained terrace close to the river bank.

Species: Larch Volume: 346 board feet to the acre.
Black spruce 973 " " " " "
Total 1319 board feet to the acre.

Plot #3

Topography: Strip extends through swampy half mile from the river.

Species: Larch Volume: 182 board feet to the acre.
Black spruce 645 " " " " "
Total 827 board feet to the acre.

Plot #4

Topography: Generally flat, some swamp. Area fairly well drained.

Species: Larch Volume: 195 board feet to the acre.
Black spruce 642 " " " " "
Total 837 board feet to the acre.

Plot #5

Topography: Wet swampy area. Very poor drainage.

Species: Larch Volume: 147 board feet to the acre.
Black spruce 279 " " " " "
Total 426 board feet to the acre.

Plot #6

Topography: Poorly drained. Some swamp and muskeg.

Species: Larch Volume: 39 board feet to the acre.
Black spruce 588 " " " " "
Total 627 board feet to the acre.

Plot #7

Topography: Generally flat, some bog and swamp.

Species: Larch Volume: 188 board feet to the acre.
Black spruce 1008 " " " " "
Total 1196 board feet to the acre.

Note: Approximately 20% of the larch affected by heart rot.

Plot #8

Topography: Area fairly well drained. Heavy moss cover.

Species: Larch Volume: 462 board feet to the acre.
Black spruce 700 " " " " "
Total 1162 board feet to the acre.

Plot #9

Topography: Much of the area is low and swampy.

Species: Larch Volume: 156 board feet to the acre.
Black spruce 780 " " " " "
Total 936 board feet to the acre.

Plot #10

Topography: Very broken by a series of gullies and ridges. Timber lies in small pockets.

Species: Larch Volume: 168 board feet to the acre.
Black spruce 793 " " " " "
Total 961 board feet to the acre.

Plot #11

Topography: Rock ridge well drained. Caribou moss cover in hollows.

Species: Larch Volume: 39 board feet to the acre.
Black spruce 771 " " " " "
Total 810 board feet to the acre.

Plot #12

Topography: Flat and poorly drained. Heavy moss cover. Considerable amount of scrub timber.

Species:	Larch	Volume:	519 board feet to the acre.
	Black spruce		323 " " " " "
	White spruce		126 " " " " "
		Total	968 board feet to the acre.

Plot #13

Topography: Steep 18° hillside sloping towards river. Well drained. Heavy moss and bush cover.

Species:	Larch	Volume:	216 board feet to the acre.
	Black spruce		2307 " " " " "
	White spruce		246 " " " " "
		Total	2769 board feet to the acre.

Plot #14

Topography: Flat plateau one mile from river. Area well drained. Heavy moss and bush cover.

Species:	Larch	Volume:	42 board feet to the acre.
	Black spruce		1697 " " " " "
		Total	1739 board feet to the acre.

Plot #15

Topography: Flat well-drained area adjacent to river. Heavy moss cover.

Species:	Larch	Volume:	135 board feet to the acre.
	Black spruce		1080 " " " " "
	White spruce		199 " " " " "
	Balsam fir		24 " " " " "
		Total	1438 board feet to the acre.

Plot #16

Topography: Gentle well-drained slope towards river. Light bush and moss cover.

Species:	Larch	Volume:	228 board feet to the acre.
	Black spruce		2391 " " " " "
	White spruce		172 " " " " "
		Total	2791 board feet to the acre.

Plot #17

Topography: Steep slope towards river. Area well drained. Light moss and bush cover.

Species:		Volume:
	Larch	24 board feet to the acre.
	Black spruce	2999 " " " " "
	White spruce	142 " " " " "
		Total 3165 board feet to the acre.

Plot #18

Topography: River flat well drained. Light moss cover.

Species:		Volume:
	Larch	18 board feet to the acre.
	Black spruce	1081 " " " " "
		Total 1099 board feet to the acre.

Plot #19

Topography: Bank of small creek draining into river. Heavy underbrush.

Species: Black spruce Volume: 4752 board feet to the acre.

Plot #20

Topography: Steep side hill sloping towards the river. Well drained. Heavy moss cover.

Species: Black spruce Volume: 2704 board feet to the acre.

Plot #21

Topography: Steep hillside sloping towards river. Well drained. Heavy moss cover.

Species: Black spruce Volume: 2397 board feet to the acre.

Plot #22

Topography: Sandy well-drained terrace, fairly heavy moss and bush cover.

Species:		Volume:
	Larch	18 board feet to the acre.
	Black spruce	1879 " " " " "
		Total 1897 board feet to the acre.

Plot #23

Topography: Steep hillside sloping towards river. Heavy moss and bush cover.

Species:		Volume:
	Larch	18 board feet to the acre.
	Black spruce	5980 " " " " "
	White spruce	2173 " " " " "
	Total	8171 board feet to the acre.

Plot #24

Topography: Gentle slope towards river. Well drained. Light moss cover.

Species:		Volume:
	Black spruce	6164 board feet to the acre.
	White spruce	136 " " " " "
	Total	6300 board feet to the acre.

Plot #25

Topography: Gentle slope towards creek. Light moss cover.

Species:		Volume:
	Larch	6 board feet to the acre.
	Black spruce	3592 " " " " "
	White spruce	200 " " " " "
	Total	3798 board feet to the acre.

Note: Plot #24 - Trees show only slight taper for first 20 feet. Timber well suited for building log houses.

Plot #26

Topography: Well-drained slope towards creek. Open park land developed.

Species:		Volume:
	Larch	72 board feet to the acre.
	Black spruce	2315 " " " " "
	Total	2387 board feet to the acre.

Plot #27

Topography: Broken by numerous small gullies and ridges. Heavy moss cover.

Species:		Volume:
	Larch	195 board feet to the acre.
	Black spruce	2105 " " " " "
	Total	2300 board feet to the acre.

Plot #28

Topography: Well-drained river flat. Heavy underbrush.

Species:		Volume:
	Black spruce	11,548 board feet to the acre.
	White spruce	281 " " " " "
	Total	11,829 board feet to the acre.

Plot #29

Topography: Steep hillside sloping towards river. Heavy moss and bush cover.

Species:		Volume:
	Larch	135 board feet to the acre.
	Black spruce	2807 " " " " "
	Total	2942 board feet to the acre.

Plot #30

Topography: Steep hillside sloping towards the river. Well drained. Heavy moss cover.

Species:		Volume:
	Black spruce	2436 board feet to the acre.

Plot #31

Topography: Flat well-drained area adjacent to river. Heavy moss cover.

Species:		Volume:
	Larch	323 board feet to the acre.
	Black spruce	2130 " " " " "
	Total	2453 board feet to the acre.

Plot #32

Topography: Very steep hillside. Light caribou moss cover.

Species:		Volume:	
	Larch		346 board feet to the acre.
	Black spruce		4423 " " " " "
		Total	4769 board feet to the acre.

Plot #33

Topography: High plateau above river. Well drained. Light caribou moss cover.

Species:		Volume:	
	Larch		419 board feet to the acre.
	Black spruce		4002 " " " " "
	White spruce		107 " " " " "
		Total	4528 board feet to the acre.

Plot #34

Topography: Flat well-drained area. Heavy moss cover.

Species:		Volume:	
	Larch		159 board feet to the acre.
	Black spruce		726 " " " " "
		Total	885 board feet to the acre.

Plot #35

Topography: Rocky plateau adjacent to river. Well drained. Heavy moss and bush cover.

Species:		Volume:	
	Larch		264 board feet to the acre.
	Black spruce		975 " " " " "
	White spruce		144 " " " " "
		Total	1383 board feet to the acre.

Plot #36

Topography: Flat area adjacent to river. Poorly drained. Some bog and swamp. Heavy moss cover.

Species:		Volume:	
	Larch		93 board feet to the acre.
	Black spruce		1382 " " " " "

White spruce 113 board feet to the acre.

Total 1588 board feet to the acre.

Plot #37

Topography: Rocky broken country laced with numerous small ravines. Well drained. Heavy caribou moss cover.

Species:		Volume:
	Black spruce	1152 board feet to the acre.
	White spruce	51 " " " " "
	Total	1203 board feet to the acre.

Plot #38

Topography: Located on steep hillside three-quarters of a mile from river. Area well drained. Heavy moss cover.

Species:		Volume:
	Larch	183 board feet to the acre.
	Black spruce	2645 " " " " "
	White spruce	161 " " " " "
	Total	2989 board feet to the acre.

Plot #39

Topography: Steep hillside sloping towards river. Well drained. Heavy moss cover.

Species:		Volume:
	Larch	303 board feet to the acre.
	Black spruce	918 " " " " "
	White spruce	54 " " " " "
	Total	1275 board feet to the acre.

Plot #40

Topography: On very steep hillside sloping towards small tributary creek. Area well drained. Heavy moss cover.

Species:		Volume:
	Black spruce	3606 board feet to the acre.
	White spruce	497 " " " " "
	Total	4103 board feet to the acre.

Plot #41

Topography: Steep hillside sloping towards river. Well drained. Heavy moss and bush cover.

Species: Larch — Volume: 60 board feet to the acre.
Black spruce — 1344 " " " " "
Total 1404 board feet to the acre.

Plot #42

Topography: Flat area immediately adjacent to river. Poorly drained. Considerable swamp and bog. Heavy moss cover.

Species: Larch — Volume: 12 board feet to the acre.
Black spruce — 822 " " " " "
Total 834 board feet to the acre.

Plot #43

Topography: Low sandy terrace. Well drained. Light moss cover.

Species: Larch — Volume: 508 board feet to the acre.
Black spruce — 654 " " " " "
Total 1162 board feet to the acre.

Plot #44

Topography: Sandy terrace adjacent to river. Well drained. Heavy moss cover.

Species: Larch — Volume: 571 board feet to the acre.
Black spruce — 843 " " " " "
Total 1414 board feet to the acre.

Plot #45

Topography: Located on large well-drained river flat. Heavy moss cover.

Species: Larch — Volume: 381 board feet to the acre.
Black spruce — 891 " " " " "
Total 1272 board feet to the acre.

Plot #46

Topography: Large well-drained terrace extending approximately 2 miles away from river. Heavy moss cover.

Species:		Volume:	
	Larch	204	board feet to the acre.
	Black spruce	1209	" " " " "
		Total 1413	board feet to the acre.

APPENDIX A: REPRESENTATIVE TREE SAMPLES

Koksoak - BLACK SPRUCE

D.B.H.	LENGTH	AGE	ROT
4"	25	75	Nil
4"	24	73	Nil
4"	24	72	*
4"	20	42	Nil
4"	19	58	Nil
4"	26	138	Nil
4"	23	118	Nil
4"	27	87	Nil
4"	26	113	Nil
4"	21	123	Nil
	23.5 ft.	89.5 years	5% rot
6"	31	118	Nil
6"	31	64	Nil
6"	32	77	Nil
6"	26	63	Nil
6"	28	67	Nil
6"	26	79	Nil
6"	22	84	Nil
6"	26	89	Nil
6"	30	63	Nil
6"	28	64	Nil
6"	27	82	Nil
	28 ft.	77.3 years	Rot no factor.
8"	28	117	Nil
8"	39	125	Nil
8"	30	44	Nil
8"	36	57	Nil
8"	37	81	Nil
8"	38	101	Nil
8"	37	94	Nil
	35 ft.	88.5 years	Rot no factor.
10"	43	88	Nil
10"	43	102	Nil
10"	33	77	Nil
10"	37	91	Nil
10"	41	110	Nil
	39.5 ft.	93.6 years	Rot no factor.

D.B.H.	LENGTH	AGE	ROT
12"	45	182	*
12"	37	97	Nil
12"	43	126	Nil

Koksoak - LARCH

4"	25	71	Nil
4"	27	63	Nil
4"	32	56	Nil
4"	28	81	Nil
4"	26	51	Nil
4"	34	58	Nil
	28.5 ft.	63 years	Rot no factor.
6"	31	73	Nil
6"	39	74	Nil
6"	28	54	Nil
6"	35	92	Nil
6"	30	46	Nil
6"	29	64	Nil
	32 ft.	67 years	Rot no factor.

* - rot present

8"	40	131	*
8"	39	97	Nil
8"	37	107	Nil
8"	44	123	Nil
8"	40	96	Nil
	40 ft.	111 years	
10"	49	53	Nil
10"	40	84	Nil
10"	43	93	*
10"	48	109	Nil
10"	46	127	Nil
	45 ft.	93 years	15% rot
12"	45	136	* 2 ft. from stump
12"	52	133	Nil
12"	56	153	Nil
12"	47	144	Nil
	50 ft.	141.5 years	15% rot

Koksoak - Balsam Fir

6"	31	87	Nil
8"	39	146	Nil

D.B.H.	LENGTH	AGE	ROT
	WHITE SPRUCE		
6"	34	76	Nil
8"	39	93	Nil
George -	BLACK SPRUCE		
4"	26	103	Nil
4"	25	131	Nil
4"	27	172	Nil
4"	25	92	Nil
4"	26	117	Nil
4"	24	109	Nil
4"	27	94	Nil
4"	28	116	Nil
4"	25	160	Nil
4"	26	120	Nil
4"	24	153	Nil
4"	25	94	Nil
	25.7 ft.	122 years	Rot no factor.
6"	29	121	*
6"	29	133	Nil
6"	28	102	Nil
6"	29	144	Nil
6"	24	145	Nil
6"	25	130	Nil
6"	27	104	Nil
6"	28	165	Nil
6"	22	218	Nil
6"	37	173	Nil
6"	28	129	Nil
6"	27	181	*
6"	32	122	Nil
6"	27	144	*
6"	27	172	Nil
6"	29	153	Nil
6"	26	104	Nil
6"	28	141	Nil
6"	28	119	Nil
6"	33	137	Nil
6"	29	134	Nil
6"	31	108	Nil
6"	30	87	Nil
6"	29	106	Nil
	28.5 ft.	136 years	Approx. 10% rot factor.

* - Rot present.

D.B.H.	LENGTH	AGE	ROT
8"	32	175	Nil
8"	38	189	Nil
8"	35	152	Nil
8"	35	149	Nil
8"	39	172	Nil
8"	25	137	Nil
8"	34	122	Nil
8"	30	171	Nil
8"	26	193	Nil
8"	28	210	Nil
8"	28	102	Nil
8"	24	207	Nil
8"	32	168	Nil
8"	45	131	Nil
8"	46	168	Nil
8"	44	141	Nil
8"	30	160	Nil
8"	34	178	*
8"	34	158	Nil
8"	32	177	*
8"	27	173	*
8"	36	112	Nil
8"	32	155	Nil
8"	34	123	Nil
	33.5 ft.	163 years	10% rot factor.
10"	35	119	Nil
10"	44	163	Nil
10"	36	147	Nil
10"	41	164	Nil
10"	33	211	Nil
10"	47	187	Nil
10"	32	183	Nil
10"	38	120	Nil
10"	37	172	Nil
10"	37	117	Nil
10"	28	143	Nil
10"	34	164	Nil
	37 ft.	157.5 years	No rot factor.
12"	53	142	*
12"	51	143	Nil
12"	34	219	Nil
12"	38	193	*
12"	31	194	Nil
12"	38	166	Nil
12"	39	187	Nil
12"	38	162	Nil
	39 ft.	164.5 years	25% rot.

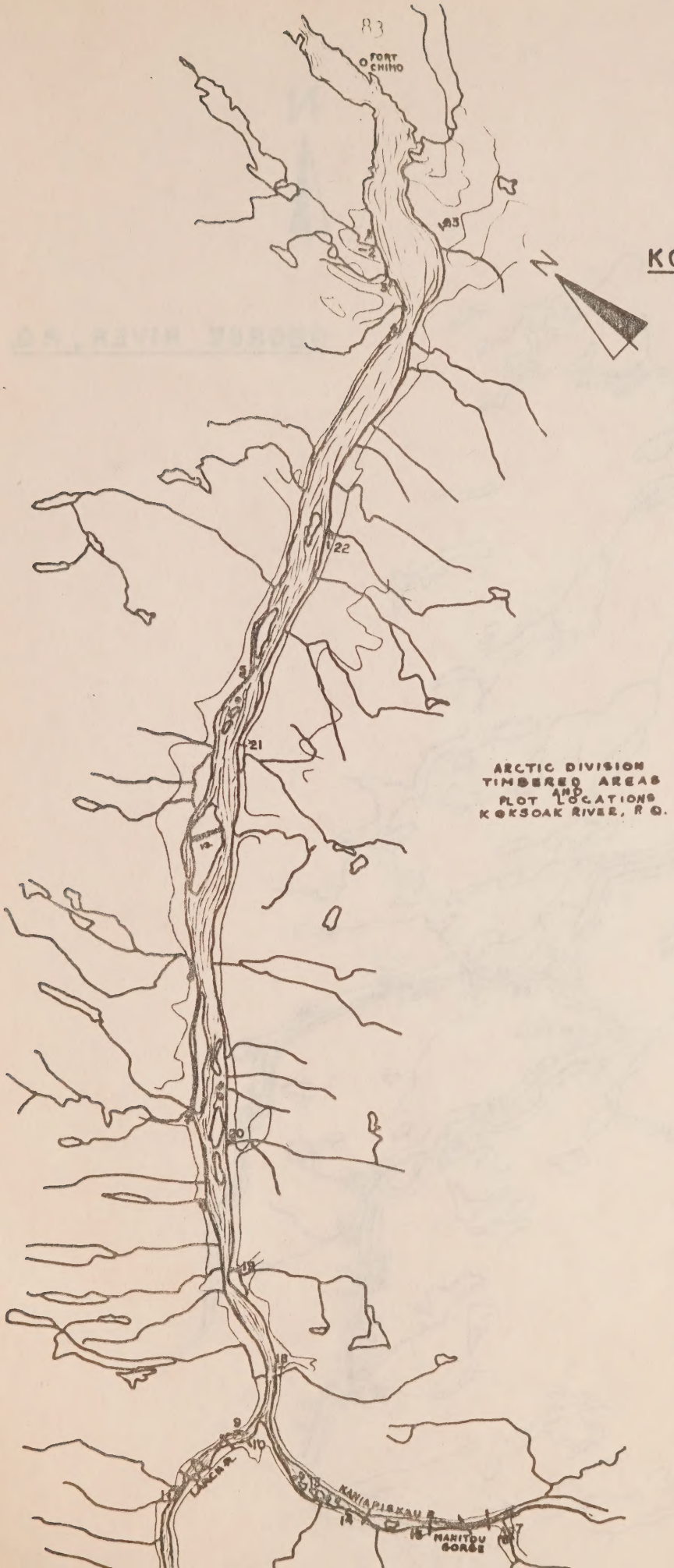
* - Rot present.

D.B.H.	LENGTH	AGE	ROT
George - BLACK SPRUCE (Continued)			
14"	49	176	Nil
14"	52	163	Nil
14"	36	226	Nil
14"	40	149	Nil
14"	44	168	Nil
14"	48	164	Nil
	45 ft.	174 years	Nil
16"	56	182	Nil
16"	59	196	Nil
16"	36	206	Nil
16"	35	199	Nil
16"	60	217	Nil
	49 ft.	200 years	10% rot.
18"	63	187	Nil
18"	48	137	*
18"	61	211	Nil
18"	60	207	Nil
	58 ft.	186 years	Nil
George - LARCH			
4"	25	115	Nil
4"	26	94	Nil
4"	29	72	Nil
4"	26	83	Nil
4"	34	110	Nil
4"	31	123	Nil
	29.5 ft.	99.5 years	Nil
6"	27	137	Nil
6"	32	82	Nil
6"	34	157	*
6"	28	77	Nil
6"	35	97	Nil
6"	33	87	Nil
6"	28	87	Nil
6"	32	151	Nil
6"	34	132	Nil
	31.5 ft.	112 years	Nil
8"	39	95	Nil
8"	36	147	Nil
8"	42	152	Nil
8"	35	190	Nil
8"	34	138	Nil
8"	44	145	Nil
	38.5 ft.	144.5 years	Nil

D.B.H.	LENGTH	AGE	ROT
George - LARCH (Continued)			
10"	47	176	Nil
10"	34	139	Nil
10"	39	172	Nil
10"	48	143	Nil
10"	58	162	Nil
	45 ft.	152.5 years	Nil
12"	42	153	Nil
12"	47	177	Nil
12"	54	164	Nil
12"	51	133	Nil
12"	43	161	Nil
	47.5 ft.	157.5 years	Nil

★ - Rot present.

George - BALSAM FIR			
6"	28	106	Nil
8"	32	153	Nil
LARCH			
6"	37	118	Nil
6"	34	127	Nil
6"	39	139	Nil
8"	43	142	Nil
8"	40	126	Nil
10"	47	139	Nil
10"	44	146	Nil
12"	51	154	Nil



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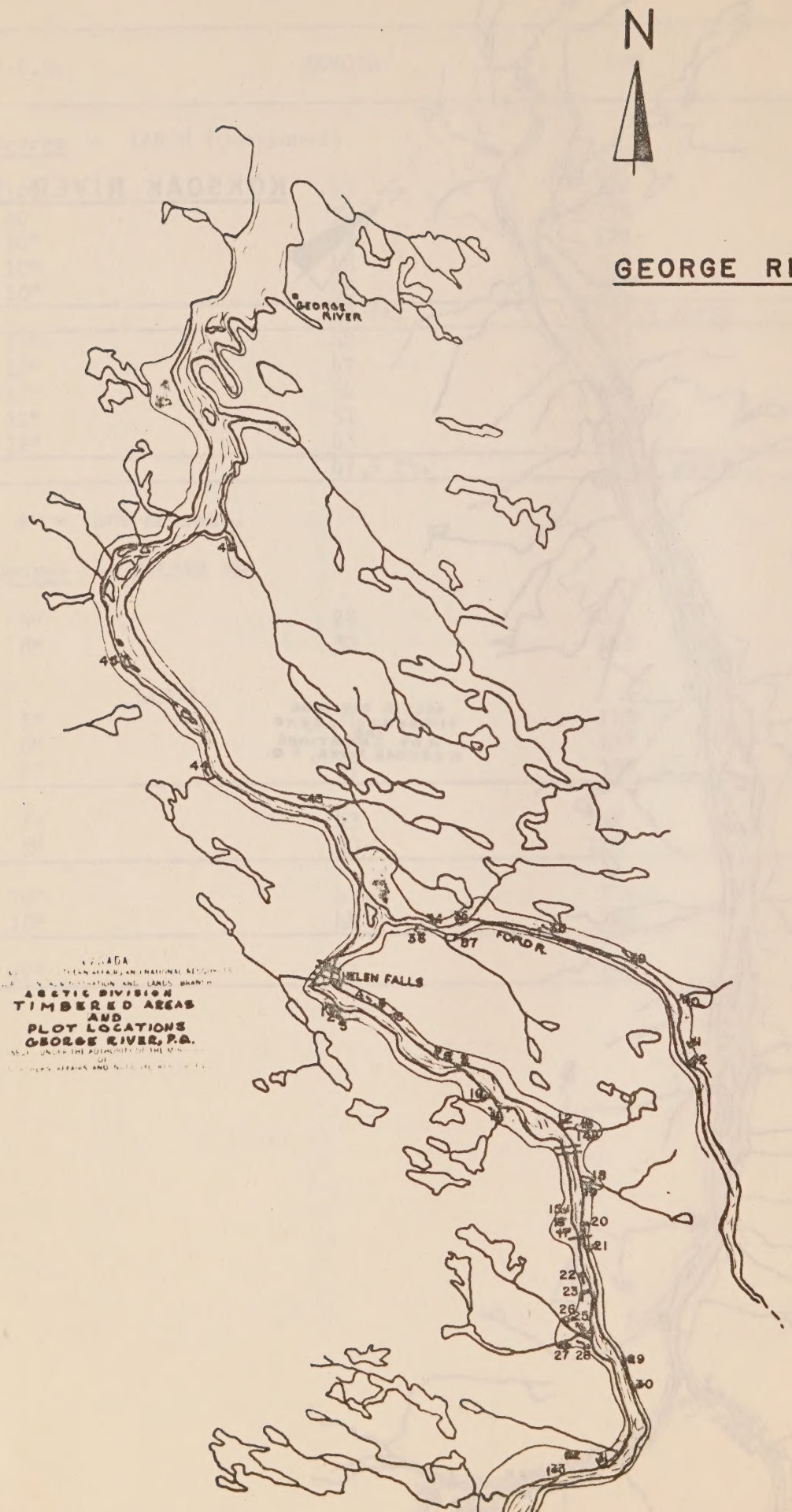
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